

# University News

MONDAY, AUGUST 31, 1987

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Dr. D. Raj Reddy (second from left), Director, Robotics Institute, Carnegie Mellon University, Pittsburg, USA, delivers the convocation address at the IIT, Bombay. Seated on his right and left are Shri D.V. Kapur, Chairman, Board of Governors and Prof. B. Nag, Director of the Institute respectively.

# **GANDHIJI UNIVERSITY**

## **NOTIFICATION**

Applications are invited from qualified candidates for appointment to the following posts in the University

Name of Department	Category and No. of posts	
Basic Medical Sciences	Professor	— one
	Reader	— Two
	Lecturer	— Four
Polymer Chemistry	Reader	— Two
	Lecturer	-- Four
International Relations	Reader	— Two
	Lecturer	— Four

Forms of application and other details regarding qualifications, age, scale of pay, etc., can be had directly or by post from the Office of the Gandhiji University on requisition, specifying the post for which the form is required, and on payment of Rs. 2 - through the prescribed pay-in-slip at any branch of the State Bank of Travancore. In the case of persons residing outside the State Crossed Postal Order for Rs. 2 - drawn in favour of the Finance Officer will be accepted. The requisition for application forms shall be addressed to the Registrar, Gandhiji University, Kottayam, Kerala-686 002. Those who wish to get the application by post shall also send a self addressed envelope of size 27 cm x 12 cm along with the request.

**Note :** Those who have applied for the above posts in response to University Notification dated 22nd January 1986 need not apply afresh. They need only send details regarding additional qualifications, if any, acquired subsequently. However, those who had applied for the post of Professor in Basic Medical Sciences shall apply again.

**The last date for the receipt of filled in application is 25th September 1987.**

**Prof. K. Madhavan Pillai**  
**REGISTRAR**

Office of the  
Gandhiji University  
Kottayam-686 002  
Dated, 20th August 1987.

# UNIVERSITY NEWS

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Editor:  
**SUTINDER SINGH**

# THE TEACHERS' STRIKE

G. B. K. Hooja\*

Gajendra Gadkar Committee Report on Governance of Universities  
& Colleges (1971) *inter alia* observed the following :

"We would like to emphasise the fact that in the matter of making the university education purposeful, meaningful and significant for the teachers, students and the general community, what ultimately matters is not so much the pattern to which the university and its statutory bodies conform, but the spirit of dedication and the sense of purpose which should guide the activities of those who will function in these statutory bodies. The administrative wing of the university as well as the academic wing must work in a spirit of cooperation, understanding, and imagination, and human touch must be present on the university campus, in the classrooms, co-curricular activities and even in purely administrative matters. Lines of communication between different sections of the university community must always remain alive and should never be allowed to be blocked. University organisation should prove to the community at large that debate and dialogue, communication and exchange of ideas carried on freely, fearlessly and objectively, can solve all problems."

In a society where one-third of the people live below the poverty line and two-thirds are illiterate, problems and conflicts are bound to arise continuously, particularly so in a climate of rising expectations, generated by a democratic system of government. In fact, with passage of years, the patience of the electorate is sure to be exhausted and they may be obliged to take recourse to extra-parliamentary measures. It is in this milieu that the universities which are expected to identify problems, social and physical, all the time and find solutions thereof are expected to give a lead "*Yena Gataah mahaujanaah, sa panthaa*". The path treaded by the noble is followed by the community. The university teachers are expected to mould by precept as well as speech the style and manner of conduct of the populace and particularly the students, who in time to come shall occupy positions of authority and decision making, so that the society advances to its goals of Justice, Liberty, Equality and Fraternity in a sustained and orderly manner. It is a truism that no university can rise above the standards of its teachers. If the teachers take to the streets, who shall look after the interests of the students, the young hopefuls in whom the hopes of the country rest?

We shall not enter into the details of Rupees and Nai Paisas dropping into the pay packets of the teachers. Let this be negotiated across the table, from time to time. But we would like to point out that excellence is the hallmark of a university and if merit suffers on account of nepotism, casteism, regionalism, son-o-soilitis, rule of sifarish, queue-jumping and politicking in any form the university system is bound to degenerate; and this is what we have to guard against. This exactly is the justification for the National Testing Service (NTS) at the point of entry into the educational profession

(Continue. I o 1 page 14)

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5, Abul Fazal Road, New Delhi-110 001.

# Vocationalization and the Need for Community/Junior Colleges

K. L. Joshi\*

## Education Policy and its Implementation

It has been nearly 21 years since the report of the Education Commission was published (1966) and three Education Policy Statements followed. The First was in 1968 based on the recommendations of the Education Commission with some practical points of modification such as, placing of +2 stage both in Schools and Colleges. As the statement had many difficulties in implementation, the Second and revised Policy was framed as a draft in 1979 but could not be put up for action on account of political changes at the Centre and the economic and social environment uncongenial to the implementation of recommendations. The Third Policy Statement following the publication of the **Challenge of Education—a policy perspective** August 1985, was published in July 1986 which is now being implemented but is not free from the constraints described in the "challenge" document though liberal financial provisions, along with a raise in teachers' salaries, are being made.

The question is how far the Policy will succeed in implementation. It has got the blessings of Central Advisory Board of Education, along with the labour of 23 task forces basic to which is the excellent "challenge" document which diagnosed the limitations and constraints but finds it hard to provide remedies and solutions. It has got Parliamentary support. There are three types of people whose reactions have to be taken into consideration. The first type is that of persons, mostly bureaucrats who can't think of anything else but the policy and hail it as an important statement for educational programme. The second type is that of die-hard cynics among the intellectuals found in the midst of College & University Teachers who don't think much of any policy of this type and who feel that the real change, social and economic, can be brought about only by Leaders of Teachers who through organized thinking and programme of action can bring about a revolutionary change, if finances were available. The third type is that of the silent spectators who read through papers the changes taking place and wait for the best

results in spite of corrupt practices and ill-managed institutions.

Actually the real policy of development is the one that can be chalked out by the Planning Commission which is aware of the social, political and economic compulsions and discusses annual plan of every State for implementation and provides funds every year. They have to be advised by the Ministry of Human Resource Development and the State Governments' Departments of Education. Most of the new ideas will have a gestation period and will be taken for consideration in the VIII Plan, after watching the progress during the next 2-1/2 years of the current VII Plan.

The Minister of Human Resource Development has recently stated that he was open to any new ideas and any reasonable improvement in the policy. To that extent, new ideas could be incorporated in the annual and the VIII Five Year Plan

We might state that the "challenge" document and the New Education Policy analyze the difficulties in the educational scene but palpably do not reduce them to four fundamental ingredients of the scenario. These are (1) Finance; (2) Numbers, (3) Structure, and (4) Co-ordination in management, administration and organization. Promise of larger financial provision does not take into consideration that our per capita income is very low and we do not consider the masses that are below poverty line and are estimated to be about 40% of the population. In advanced countries High-tech education has been provided five to ten times amounts that we could provide. The priorities of the needs of people are—employment, shelter, food and good drinking water. The economic planning seems to take care of these first and education gets lower priority.

The numbers in Schools & Colleges have risen to figures which the Education Commission had not realistically anticipated. 20 years ago in relation to financial provisions, 6% of national income may have been adequate but is now insufficient for this biggest sector of economy from the point of view that today we are providing resources for education only next to

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those for Defence. However attempts are being made to do as much as we can.

But the third factor of structure remains a problem and it is linked with the corruption that has entered into the system in administration, organization and management. Assuming that this latter could be remedied the third factor of structure needs to be reconsidered.

### Why Junior/Community Colleges ?

The biggest single problem in the System of Indian Education is **structure and articulation**. From 1944, that is from publication of the Sargent Report, through Radhakrishnan Report on University Education, 1950, Mudaliar Commission on Secondary Education, 1953, Sampurnananda Committee Report 1962 and Education Commission (Kothari) Report 1966, we have had perplexing, contradictory and compromising recommendations, though the Kothari Commission finalized the structure as 10+2+3. But +2 sector which is the most important segment of education in the report seems to be handled in a half-hearted way. Some reflection on the background of this pattern may help us understand the present position

The problem was no doubt recognized by the Education Commission (1964-66) but it suggested the Sadler Commission (1919) pattern of 10+2 upto Intermediate standard followed by a 3-year degree course. This was also a recommendation of the Radhakrishnan Commission (1950). But the Sargent Report (1944) and the Mudaliar Report (1953) suggested 11+3 pattern and Sampurnanand Committee (1962) again recommended 10+2+3 pattern with the suggestion that +2 may be in Colleges or Schools, a flexible approach suggesting also Junior Colleges at the +2 stage. The Education Commission (1966) recommended the 10+2+3 pattern but used the term Higher Secondary School for the +2 stage. Historically, since the establishment of the three Universities of Calcutta, Bombay and Madras in 1857, the two classes (+2) have been with the Universities as Intermediate Classes and major universities always found it difficult to part with these classes, with the exception of Universities in U.P. which had established separate Intermediate Colleges that could as well have been turned into Junior/Community Colleges of the U.S.A. pattern. It is historically interesting that the three Universities of Calcutta, Bombay and Madras had decided against the recommendation of the Sadler Commission (1919) in

spite of pressure from the Central Govt. They pointed out that such a system was uneducational, unacademic and uneconomical.

The reasons given by Education Commission (1966) for the failure of the Sargent Report recommendation of 11 year higher secondary system, might apply to the 12 year school proposed by them (Education Commission Report, pp 25-28) (*See also* author's **Problems of Higher Education in India**, Popular Prakashan, 1977, p. 139). My point in brief is that for Indian Conditions if 11 years' Higher Secondary Course was a failure it would also be a failure for the 12 year school.

### Comparative Perspective

During the last three decades we have been influenced by the World View of Education (*See*, Eric Ashby, **Structure of Higher Education : A World View**, 1972). Our System of Education was British historically and since the establishment of three Universities of Calcutta, Bombay and Madras in 1857 we have developed over 160 Universities today with lakhs of students. All over the world numbers of institutions have increased. But in India, Curzon & Sadler apparently placed before us the Oxford model which is inimitable for any country. The Education Act of 1944 in U.K (Butler Act) reformed the school system with emphasis on VI Form where a student spent two or three years, preparatory to Higher Education. Our Intermediate Classes in the colleges of the Indian university system were meant for the same purpose and they should once more be revived in the form of Junior/Community Colleges and also in the existing colleges.

The U.S.A. pattern of 12 + 4 is very costly for us. Education Commission had quoted Matchlup & Weisner at page 24, stating that for modern age of science and technology years of schooling have to be abridged. In terms of the Carnegie Commission Reports (1968-74) and particularly the report **Less Time, More Options**, 1971 this is possible. It is no use therefore prolonging the 10 year school to 12 years and adding the Intermediate Classes to the school system for Indian conditions.

We are influenced by the British system of VIth Form +3 year degree course, the U.S.A. system of 12 year school +4 year of degree education and the U.S.S.R. system of 10 year schooling +5 years of degree education (2+3). But we have confused our pattern so much that we have created two Boards,

one at S.S.C. level of 10th class and the other at the 12th class—both created by State Govts. and controlled by them.

Modification to the recommendation of Education Commission was seen in the report of the Committee of the Members of Parliament on Education, 1967, which said "as a transitional measure the attachment of these classes (11th & 12th) to colleges may be continued, where necessary". However the Ministry of Education later seems to have come to a final conclusion in the National Policy on Education (1968) stating "it will be advantageous to have broadly uniform educational structure in all parts of the country. The ultimate objective should be to adopt the 10+2+3 pattern, the higher secondary stage of two years being located in schools, colleges or both according to local conditions".

This has created utter confusion. students with good grades in 10th class Board's Exam go to the colleges where 11th & 12th classes are available only to the best students and a few select schools which do not have academic facilities of good teachers, libraries, laboratories, accommodation, and equipment admit the remaining students. NCERT takes charge of these two classes for courses of study and textbooks without the facilities of Academic Councils and Boards of Studies of the universities.

### **Clearing of Confusion**

To clear the confusion, without creating more problems in relation to the New Education Policy, 1986, I suggest the following steps .

(1) The School should be recognised as a 10 year institution on the U.S.S R. pattern in which initiation to science and technology is made in the school system.

(2) This should be followed by a 2 year institution to be called Junior or Community College incorporating other institutions of vocational training such as ITIs (Labour & Employment Ministry), Polytechnics (3 year course), Junior Colleges for primary teachers and various other craftsmen training institutions involving the Ministries of Education (now H.R.D.), Labour, Defence, Industry, Health, Agriculture, Railways, Transport & Communication, etc., whose need for middle level manpower is recognised and also the private institutions for craftsmen training for both men and women.

(3) The two classes can also continue in the colleges affiliated to Universities as Intermediate classes (and not Higher Secondary Classes—a phrase typical of Indian coinage).

(4) The Universities will have 5 classes in their affiliated colleges, 2+3, and will hold examinations for Arts, Science, Commerce, Vocational Courses of all types and of various duration, (certificate, diploma and special). The courses of studies will be decided by the universities through their Boards of Studies and Academic Councils.

(5) There will be Special Division in the UGC for maintenance of academic standards in Junior/Community Colleges, and the U.G.C. should be given generous financial provisions for grants. For their academic requirements the Junior/Community Colleges would work in collaboration with the State Governments.

(6) For this purpose the U.G.C. will have a special Council or Board for middle level manpower training programme and for maintenance of academic standards. They will have members for coordination from the AICTE (All India Council of Technical Education), NCTVT (National Council for Training in Vocational Trades of the Ministry of Labour & Employment), and representatives of the branches of learning in Agriculture, Medicine, Industry, Railways, Defence, Communication etc. This will be a large council with representatives of State Governments each of which will have a council for the same purpose. It has to be organizationally a perfect body. The Junior/Community Colleges will be affiliated to local Universities.

### **Vocationalization and the Concept of Junior/Community Colleges**

The Conference of Education Ministers and Education Secretaries organised by the Ministry of Human Resource Development in April 1987 discussed mostly vocationalization at the school level with a provision of Rs. 7 crores unspent this year and of Rs. 50 crores for the next year. They discussed the problem of securing trained teachers and practicability of such a step. The question is—will students opt for vocationalization at an early stage ?

Our main stand is some vocationalization may be introduced in schools as hobbies to develop familiarity with equipment but we should have a vision of the future from the point of view of manpower at the

middle level. Real vocationalization needs elementary knowledge of Maths, Physics, Chemistry and Biological Sciences at roots.

We therefore suggest the U.S.S.R. pattern of 10 year school system be adopted with a 2+3 pattern higher education. The +2 stage is not a school stage but one of higher education, an Intermediate stage for higher education and research. It is logical that it should be accommodated in colleges and also in Junior/Community Colleges of the U.S.A. type. The three year degree course of the U.K. model should continue—not the 4 year model of U.S.A. type for the latter is useful only if it is preceded by 12 year school system of the U.S.A. type. But this is both costly and wasteful of our inadequate resources. Besides some thinkers in U.S.A. feel that “less time, more options” is a progressive educational policy and renowned scholars like—Machlup & Weisner feel that abridgment of 12 year to 10 year (or even less, if possible) is the need for the modern age. Machlup’s study on “*Production & Distribution of Knowledge in the U.S.A.* (1962) has indicated that the learning process in the U.S.A. schools should be accelerated

Jerome B. Weisner, former Science Adviser to the U.S. President said in 1965 :

“Many people are impressed by the fact that the Soviet Union’s *Ten-year* cycle of primary and secondary education requires that all students must take *five* years of physics, *six* years of mathematics, *three* years of biology, and *four* of chemistry with the content of the work during the last two years being comparable to that of the usual introduction courses in these subjects offered in our liberal arts colleges. By contrast corresponding school period contains twelve rather than ten years but provide on the average only one-fifth as much training in mathematics and the sciences. There is insufficient evidence to show that the intensity of early Soviet Scientific Training is either necessary or desirable, particularly if it involves sacrifices of some emphasis on the humanities but it is evident that the standard programme in our schools is far from optimum” (Quoted in Education Commission Report p.24).

This indicates that basic education for any further training or education must be thorough as in the USSR’s 10 year school and could be a model for us before the students opt for shorter courses in technology (i.e., Polytechnic or I.T.I’s) or any form of vocational training or higher realms of intellectual pursuits in colleges and universities.

I suggest that this 10 year school of USSR pattern should be the model for us, followed by a 2 year course in the Junior/Community Colleges of U.S.A. pattern, followed by 3 year course in colleges and universities of the U.K. pattern.

The concept of Junior/Community Colleges has been there with us since 1920s when U.P. established Intermediate Colleges. The Sampurnananda Committee (1962) again suggested it. But there are half-hearted Junior Colleges in States like—Maharashtra, Andhra, Kerala, etc. The only difficulty is that in most of the States lakhs of students appear for the 10th Class (S.S.C.) examination conducted by a Govt. Board and again another Board conducts the 12th Class, examination. Upto 10th class there are not many options but for the 12th class there are many streams of Arts, Science, Commerce basic to further education at degree stage in Arts, Science,



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Commerce, Medicine, Engineering, Technology and other professional courses.

For this purpose the Junior/Community College is the right device recommended by Lord Robbins for dealing with large numbers at the intermediate stage. Robbins, as a witness before the Education Commission mentioned this device but the Commission had suggested the 2 classes should be in school and later the Ministry said they could continue in the colleges as well as schools. This is a half-hearted approach for if they are not in the colleges, they happen to be governed by the Board's regulation and not the academic compulsion of the University.

Eric Ashby and others in the reports of the Carnegie Commission published between the years 1968-74, emphasised the importance of Junior/Community Colleges with Ashby's slogan that—"more is not worse but different."

Private Classes and Institutions provide some training programmes in various crafts and trades and organized institutions such as polytechnics, women's polytechnics, Junior Teachers Training Colleges (for Primary School Teachers) nursing institutes, Industrial Training Institutes (ITIs) Trade Schools—are all uncoordinated and information is not easily available to community regarding their demands and supply. The existing institutions are inflexible in their courses of study as well as duration. Besides they do not have university status. The following points are significant :

(1) The proposed Junior/Community College belongs to the Community and is created by the Community. It is a repository of information and guidance. Its Director and other authorities are expected to guide and inform anyone who needs short-term or regular training or educational programme. It also serves as a preparatory ground or intermediate stage for transfer to higher education.

(2) There is no blind alley in any course. From the rudimentary to the higher stage all types of courses should be available.

(3) Cultural programmes could be included in this institution.

(4) For the age group 15+ to 18+ all types of courses in trades would be available. Those trades which require only a minimum education of 6 or 7 classes will admit students for training in trades in accordance with their interest and skills.

(5) It is economical to have a network of Community Colleges in proportion to the existing number of high schools and it becomes an answer to the unmanageable numbers in the existing schools.

This international device is current primarily in U.S.A., Canada, Japan and some other countries. We modify the pattern to suit Indian conditions and accept the pattern 10+2+3 (instead of U.S. model of—12+4 or 6+6+2). The aims are:

(1) More generalized Intermediate education for transfer courses to degree colleges;

(2) Junior College education for practical, professional and semi-professional vocational vocations as terminal courses;

(3) Adult Education;

(4) Formation of proper links with colleges of higher learning in Humanities, Science, Commerce, Engineering and Technology, Medicine, Agriculture and all types of specialized and research programmes, and

(5) A counselling service to assist students regardless of age in choosing careers, remedying deficiencies and fitting them as useful and productive citizens.

#### Conclusion

In the New Education Policy, like the idea of Navodaya Schools and Open University, the device of Junior/Community Colleges at the +2 stage should be introduced coordinating all activities of training at the middle level manpower as an Intermediate stage between the 10 years school and higher or tertiary stage of education as well as terminal stage for vocational courses. A Central Council and State Councils for the purpose be organized. Vocationalization should be properly fitted into this stage. A coordinated administrative and organizational system be introduced. For this purpose just as a delegation was sent to U.K. to study the aspects of Open University, a delegation of Govt. of India should be sent to U.S.A. to study the institutions of Junior/Community Colleges. Our Embassy and the American Association of Community/Junior Colleges (A.A.C.J.C.). Washington, should help. They have experience of organization and management of such colleges from the year 1900. Adoption of this device would bring a revolution in education and ensure success of the New Education Policy. □

# Advances in Science & Technology

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**Dr. D. Raj Reddy, University Professor of Computer Science and Director, Robotics Institute, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA delivered the Convocation Address at the 25th Annual Convocation of the Indian Institute of Technology, Bombay. Dr. Raj Reddy felt that advances of computers, communications, artificial intelligence and robotics will significantly transform the process of invention and scientific discovery. What we will experience during the next one hundred years will far exceed what was achieved over the past one thousand years. This will call for radical changes in our system of education and training. Further, the increase in the rate of change of knowledge was likely to increase the gap between the developed and the third world nations unless scientists in the third world countries harness the same technologies to reverse the trend. Excerpts :**

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When I graduated almost thirty years ago before the formation of the IITs, most of us at that time had not heard of the now commonplace terms such as transistor, computer, satellite, DNA, or for that matter Artificial Intelligence.

Shockley, Bardeen and Brattain of Bell Laboratories invented the transistor in 1948. About the same time, Eckert and Mauchley developed a programmable digital

ted the concept of the computer as a symbolic system capable of creating proofs of theorems in December of 1954, and the field of Artificial Intelligence was born. At the time of my graduation, I never once heard these terms or the associated concepts. I suspect most of the population of the world still believes that transistor is another name for radio.

And yet these terms and associated concepts were already well-

## Convocation

computer based on Von Neumann's theories. The concept of a geosynchronous communications satellite was proposed by Arthur Clarke in 1945 and refined for unmanned operations by John Pearce in the mid-fifties. The double helix structure of DNA was discovered by Watson and Crick in 1952.

Most significantly for me, Newell and Simon had demonstra-

known to the world scientific community, and the leading scientists could predict the implications of these advances. To be sure, not all the advances that seriously impact our lives today were known at that time. For example the integrated circuits, the microprocessor, and the process of gene splicing were yet to be discovered. Yet other predictions such as abundant 'unlimited nuclear power' has never come to pass.

The theme of my talk today is that we live in a society where advances of computers and communications will significantly accelerate the pace of inventions and discoveries, and that, you, the new generation of scientists and engineers will be responsible for harnessing these opportunities to make the world a better place to live.

In simple terms, advances in Science and Technology over the next one hundred years will far exceed those we have experienced over the past one thousand years. This will undoubtedly place a great strain on the process of training, education, and learning, necessitating radical changes in our educational system. Furthermore, this increase in the rate of change of knowledge will most likely increase the gap between the developed and third world nations unless some of you harness the same technologies to reverse this trend.

It is a common adage that we overestimate what can be done in one year and underestimate what can be accomplished in ten years. Events move faster than all but the rarest of minds can predict. Even though prediction is a dangerous business, it is useful to speculate on the effects of emerging technologies so we can be better prepared.

Looking to the future, I am sure that several of the inventions and discoveries which will significantly affect our lives over the next 30 years are already known today: cars that drive themselves, translating telephones, aerospace planes, electronic libraries, superconducting magnets, high-tech ceramics, super strong plastics, lightweight composites and so on. No doubt there will be other significant inventions that none of us can predict or foresee today.

Rather than talk about the products of invention, I would like

to share with you some thoughts on the process of invention and scientific discovery. It is my belief the advances in computers, communications, artificial intelligence, and robotics will significantly transform the process of invention and scientific discovery. Many of us are working on tools for reducing the time and cost of processes associated with creation, invention, and discovery. I would like to illustrate the nature of these tools by giving you examples from our own research:

### Simulation

One technique that is significantly helping the process of invention and discovery is 'Knowledge Based Simulation'. Computer based simulation is the technique we use to predict the behavior of a system by creating an analogue. Computers have long been used in statistical simulation within operations research to predict the behavior of systems involving random processes. With the increasing availability of high speed supercomputers capable of billions of operations per second, simulation is routinely used for tasks such as prediction of weather

The same supercomputers are also being used in the design of large and complex aircrafts by a simulation tool often called "the electronic wind tunnel". As many of you know, the creation of physical "wind tunnels" made it possible to predict the behavior of airframe structures within a laboratory environment, eliminating the need for the expensive and deadly process of constructing full scale prototypes to evaluate the airworthiness of a structure, leading to significant improvement in time and cost of producing an aircraft. A similar improvement is expected with the use of electronic wind tunnels where the airworthiness of a proposed design can be predicted

directly from a CAD model without having to build a physical model or prototype.

As many of you know, computational costs have been decreasing exponentially, providing 1000 fold improvement every twenty years or so. There appears to be no end to this rate of improvement in the near future. We can be reasonably assured that supercomputers of the size of a



*Dr. D. Raj Reddy  
delivering the convocation address*

"transistor radio" and costing less than \$1,000 will be available before the turn of the century. How will this development transform our lives? The examples I gave earlier assume the availability of such low cost super computers. The most exciting prospect for me is the possibility of creating the electronic equivalent of laboratories and libraries. In an electronic laboratory, a student can conduct or recreate physics and chemistry experiments, observe the behavior, modify the conditions (even beyond current physical limits) and gain a deep understanding of the process that can never be attained from books. This technology will have a pro-

found impact on less developed countries, making quality universal education possible for students who have no ready access to test tubes, Bunsen burners, chemicals, and instruments that students in a rich environment take for granted.

The other exciting possibility is the "electronic library". It appears that advances in computers and communications make it possible for anyone, anywhere in the world, to access and read any book, report, magazine, or newspaper, in any language at a cost of less than a cup of coffee. I will leave it to you as an exercise to derive the necessary infrastructure that must be in place and convince yourselves of the associated economies

Knowledge Based Simulation is another technique which is beginning to have significant impact on the process of invention, refinement, and adaptation of products to varying customer needs. Unlike wind tunnel simulation which uses finite element techniques, KBS uses the knowledge about the task such as facts, rules, and constraints to create a symbolic simulation of the activity. Thus a symbolic 'factory' would contain description of the machines, capacity and throughput, layout, tools, fixtures, raw materials and processes.

KBS techniques are being used in factory simulation tasks such as production planning, resource planning, layout planning, dynamic scheduling, and operator training. Use of these techniques is not yet widespread because of the need for an interdisciplinary team of experts required for codifying the relevant knowledge into an expert system. As this technology spreads it can be expected to have serious impact on productivity, quality, cost and timeliness which may result in widening the gap and dis-

parity between the efficient producers such as Japan and inefficient producers of less developed countries, eliminating what little labour cost advantage the latter may have. A country in which the costs of raw materials such as steel, aluminium and plastics is 200 to 400 percent of the international price cannot expect to compete in international markets no matter what the labour cost advantage.

### Knowledge Bases

The process of invention of new products is expected to change dramatically with the creation of complete knowledge bases. Such knowledge bases for a product would not only contain the detailed drawings of the design, but also information on the materials, tools, fixtures, machine tools, numerical control programs, process plan, assembly plan, inspection-test-diagnosis-and-repair plan, and so on. These knowledge bases are represented in a form so that variation in design and manufacturing can be created semi-automatically reducing the product development cycle by an order of magnitude.

The creation of a National Library of Designs (which includes all relevant manufacturing information) will eliminate duplication effort and lead to a market place in which the commodity being traded is knowledge rather than finished products. A glimpse of what might be possible is illustrated in a research project at our Robotics Institute under the direction of Professor Siewiorek. He and his colleagues are able, starting with a broad specification, to design and construct a working single board computer of the complexity of the IBM/PC in less than 24 hours! This is done by codifying all the relevant knowledge about design,

manufacturing, diagnosis and software creation aspects of creating a single board computer along with a chip database. Similar dramatic reductions in time and cost appear possible in the creation of many other products.

### Decision Support Systems

By far, the single largest source of delay in the creation of a new complex product is the paperwork associated with the process. The US Navy creates over 640 forms in the procurement of a single product, requiring many levels of approvals and delays. In one automatic application, more than 50 per cent of the delays (of over 70 weeks) was attributed to paperwork: creation of specifications, filling out forms, creating requests for quotations, and so on. The current technologies of electronic mail and word processing, enhanced by task specific software, can eliminate the paperwork nightmare.

### Discovery

So far I have given you examples of techniques and processes which are likely to significantly impact on the creation of products which can be characterized by evolutionary rather than revolutionary inventions. Now I would like to share with you some results of research on developing systems that may in the future assist in Scientific Discovery.

Herbert Simon and his associates have, over the past 10 years, built a series of systems which attempt to demonstrate that given the same facts and knowledge, computers can rediscover laws that were considered significant at the time of their discovery.

The Bacon system developed by Simon and Langley rediscovered Kepler's third law of planetary motion, Boyle's law, Galileo's law of uniform motion and Ohm's law. The Bacon-4 system by Simon and

Bradshaw rediscovered other physical laws such as the law of conservation of momentum, the law of gravitation, Archimedes' law of displacement, and Snell's law of refraction. It also rediscovered chemical laws such as Avogadro's method of determining molecular formulas.

### Conclusion

We have seen how the new tools, based on the computer and communication technologies are revolutionizing the process of invention and discovery. The key to improved productivity appears to be the ability to identify the major sources of cost and delay and to ask how emerging technologies can help in improving this process. Just as the invention of the automobile and the tractor have enhanced our physical capabilities by several orders of magnitude, the information technologies will significantly enhance our mental capabilities and increase the pace of invention and discovery.

To conclude, it is clear that computers and communications can truly revolutionize the nature of research and education in the 21st century. Each of us can have a personalized intelligent assistant which would use voice and vision for man-machine communication, tolerate error and ambiguity in human interaction with machines, provide education and entertainment on a personalized basis, provide expert advice on day-to-day basis, make vast amounts of knowledge available in an active form, and make ordinary mortals capable of performing superhuman tasks leading to new discoveries and inventions at an unheard of rate. It is with great anticipation that I look forward to a world shaped by your scientific endeavors. □

# Value Orientation in Higher Education

A National Symposium on Value Orientation in Higher Education will be organised by Sri Sathya Sai Institute of Higher Learning from September 24-26, 1987

Sri Sathya Sai Institute of Higher Learning founded by Bhagavan Sri Sathya Sai Baba, who is its Chancellor, was inaugurated on November 22, 1981. Within five years of its existence, the Association of Indian Universities, on the basis of the report of its Visiting Team, accepted the Institute as a regular member of the Association from April 1986. The then President of the Association indicated that "the team was impressed with the philosophy of education being followed and selected thrust areas adopted for research"

The Institute has many initiatives to its credit and has made considerable strides since its inception. It is unique and has special features in many respects. These are: residential character of the Institute with students and faculty staying on the Campuses, English as the medium of education at all levels believing in spontaneous national integration with an open admission policy enabling students from all over the country to seek admission to various courses, irrespective of income, class, creed, religion or region, making it truly national in character, free education for all who are selected on the basis of merit through a very comprehensive testing and interviewing procedure giving adequate weightage to intellectual attainments, intuitive insight, participation in social work, interest in spiritual life, an understanding of Indian culture and general enthusiasm to learn, evidence of proper motivation and potential for achievement, charging no fees whatsoever for library and

laboratory, audio-visual aids, games and sports, extra-curricular activities, medical tests and medical care and examination and tests, development of scientific research at the doctoral level relevant to local and national needs, introduction of educational technology through the installation of a modern space theatre in rural surroundings, providing an opportunity for the students and the faculty to develop various kinds of simulation exercises and also fabricate programmes of a creative and constructive character, implementation of examination reform, continuous evaluation, end semester tests grading system suggested by the University Grants Commission in a concrete form, integrated courses of five years duration in order to promote continuous education and identify and promote talent, favourable average teacher-pupil ratio of 1 : 6 with closer rapport between students and faculty, maximum number of working days, fuller utilisation of national holidays and important festivals for educational purposes and extension work, setting up of new professional faculties like Business Management and Education and finally combining professional competence with value orientation

Over and above these innovative programmes with seed value, the results of which may be visible and immediate, the Institute has operationalised the conceptual parameters of value orientation in higher education in concrete form giving a reality to the several recommendations made by various

Commissions and Committees on educational reform since Independence. These programmes were initiated, even earlier to the setting up of the Institute as a Deemed University in 1981, in two campuses one in Brindavan, Bangalore and the other in Anantapur right from 1969. However, the incorporation of the programmes of value orientation of education as part of the curricular and co-curricular activities and as integral items, where the Institute has been a pace-setter, began only when the University came into existence in 1981. Apart from this, the self-reliance and social service programme which are a part of total value orientation have also played a significant role in the development of character-building and imbibing national ethical values and international understanding

To share this experience, the Institute is organising a three-day National Symposium on "Value Orientation in Higher Education" from September 24-26, 1987, at its Prasanthi Nilayam campus

The Symposium will present practical measures adopted by the Institute to promote among our students, qualities of head and heart, an appreciation of basic human values in their application in day to day life through curricular and co-curricular programmes on the Campus, leading to overall development of personality in tune with Indian ethos and international understanding. The symposium will also discuss the possible application of several measures adopted by the Institute in this significant area in the Institutes of Higher Education. The symposium is likely to be attended by a number of Vice-Chancellors and eminent educationists.

## Bio-technology Centre at Anna Varsity

Inaugurating a Rs. 20-lakh building of the Bio-Technology Centre at Anna University and laying the foundation stone for a postgraduate students' hostel to be constructed at a cost of Rs. 34.18 lakhs, the Tamil Nadu Governor, Mr. S.L. Khurana, said that bio-technology was capable of finding new solutions to old intractable problems in public health, environment and agriculture. He said a bio-technology revolution was sweeping the developed countries as a new frontier technology. Over the last 10 years more than 200 bio-technology enterprises had sprung up in the U.S. Japan, which had declared 1981 as the year of bio-technology, had more than 300 bio-technology R & D groups. "It is up to us to utilise its potential for the wellbeing of our people," he said.

Mr. Khurana said one of the most promising areas where bio-technology could be exploited was medicine as related to public health and hoped that our scientists and technologists would succeed in the mission relating to the production of vaccines against polio, measles, rabies, hepatitis-B and whopping cough by 1990 and over a longer term against cholera, typhoid, pneumonia, malaria, leprosy, etc.

Mr. Khurana commended the contribution of Rs. 10 lakhs (being the first instalment) made by the Southern Petrochemical Industries Corporation (SPIC) to the Anna University for the setting up of a Rs. 2.5-crore SPIC bio-process laboratory. "It is precisely the kind of industry university collaboration that we have been looking forward to", he said and hoped the new centre for bio-technology

would be a landmark in the progress towards the new technology.

Mr. A.C. Muthiah, Vice-Chairman and President of the SPIC, said bio-technology was a green field area. The SPIC had identified plant bio-technology and other related fields as a growth area most suited for its diversification plans. Though it had developed a strong R & D base in this area, the collaboration with

a premier University such as Anna University lent access to the vast reservoir of scientific talent in our country that deserved a great deal of encouragement.

Dr. V.C. Kulandaiswamy, Vice-Chancellor of Anna University, said the University had an active research programme and ambitious development plans in bio-technology. He said research efforts of Anna University had a well-defined approach and objective. It had been concentrating on programmes and projects that proved that the benefit of high technology could be taken to the masses

## Adventure-cum-Shanti Tour

The Amravati University organised an all India Adventure-cum-Shanti tour on scooters under the Govt. of India's scheme for promotion of adventure amongst the university students. The objective of

sections of the society, irrespective of caste, creed or religion. The tour of the country covered a period of 40 days. 16 students from the Postgraduate teaching department of the Physical Education headed by



*Dr. K. G. Deshmukh, Vice-Chancellor, Amravati University flags off 'Shanti Yatra'*

the visit was to create an awareness of adventure, to bring about unity and integrity amongst the various

Prof V.M. Sharma participated in this historic mission.

The team visited Andhra

Pradesh, Karnataka, Tamil Nadu, Kerala, Maharashtra, Uttar Pradesh, Madhya Pradesh, Jammu and Kashmir, Rajasthan, Punjab, and Himachal Pradesh. Banners were displayed depicting thought provoking slogans like Discard dowry, Religion is humanity, India is a beautiful country and do not break it into pieces on considerations of communalism, regional feelings and casteism. The team also paid visits to the Universities of Bangalore, Raipur, Jabalpur and Kashmir and exchanged views with fellow students. The team covered a total distance of 12,600 kms. The Hon'ble Chief Minister of Jammu and Kashmir entertained the team and exhorted the student community to strengthen the secular forces and to ignore differences based on caste, region and religion.

### **National Workshop in Electronics**

The University Science Instrumentation Centre (USIC) of Gauhati University recently organised a national workshop on Electronics and Instrumentation for college teachers in Physics from July 6 to 18. Inaugurated by Prof. B. Choudhuri, former Head of the Department of Physics, Gauhati University, the workshop was designed as a refresher course in electronics keeping in view the new TDC Physics syllabus in addition to introducing the participants to recent trends in electronics, instrumentation and laboratory practices. Stress was laid on introducing the participants to transducers and microprocessors.

Over seventeen teachers from all parts of Assam participated in the workshop.

### **Special Grant for Gulbarga University**

The Karnataka State Government has sanctioned a special grant of Rs. 75 lakhs to the Gulbarga University for construction of buildings. This was stated by Dr. K. H. Cheluvaraju, Vice-Chancellor, recently in Bangalore. He said that the University had already got Rs. 25 lakhs this year and it needed more support for its expansion activities.

### **Hydrology Centre at Guwahati**

A Regional Centre of National Institute of Hydrology for North Eastern Region is proposed to be established soon at Guwahati. A two-member committee headed by Dr. Satish Chandra, Director, National Institute of Hydrology, Roorkee, has already finalised its report and the modalities for setting up of the centre are being worked out. The State Government is reported to have agreed to provide necessary land for the purpose.

### **Vacuum Science Scholarship**

The International Union for Vacuum Science Technique and Applications will award the IUUSTA Welch Scholarship 1989 to a scholar who wishes to contribute to the study of vacuum science techniques or their application in any field. Details can be had from Dr. Narain Mahishi, Secretary, Indian Institute of Science Alumni Association, Bangalore.

### **IIT in Assam**

The Government of India have decided to set up an Indian Institute of Technology (IIT) at Assam on the pattern of other IITs in the country. This was announced by the Union Minister for Human Resource Development, Shri P. V. Narasimha Rao recently in Rajya Sabha.

### **Jadavpur Varsity to Introduce Sociology Centre**

The University Grants Commission is reported to have permitted the Jadavpur University to introduce Sociology in its undergraduate and postgraduate courses from the next academic session. This was revealed by Dr. Sankar Sen, Vice-Chancellor of the University, in Calcutta recently.

## **News from Agril. Varsities**

### **BAU Adopts Tribal Hamlets**

As part of its golden jubilee celebrations the Birsa Agricultural University (BAU) has adopted five tribal hamlets in Ranchi district for ensuring co-ordinated development under the lab-to-land programme launched by the ICAR. The programme has brought under its fold about 50,000 agrarian families comprising small and marginal farmers and landless labourers to raise their socio-economic level.

According to Dr. H.R. Mishra, Dean of Veterinary Science, the programme envisaged collaboration

of all the government departments, voluntary and other agencies with the university's academic activities. Scientists, students and other workers of the university would interact and work with the villagers to acquire quality rural experience by way of teaching, training, research and extension education. He said that the programme would enable the scientists to develop appropriate technologies and modes of mechanism of technology transfer for producing desired level of socio-economic impact on the villages.

# Sports News

## Indo-Soviet Cooperation in Sports

A protocol on the cooperation in sports between India and the Soviet Union for 1987-1988, and a supplementary protocol for Soviet assistance in the development of the South Centre of the National Institute of Sports at Bangalore as a centre of excellence, were recently signed in Moscow, by M. Gramo, Chairman of the USSR State Committee for Sports and Mrs Margaret Alva, State Minister for Youth Affairs and Sports, Woman and Child Development.

The protocol on cooperation for 1987-88 is the third one in the series of agreements in sports signed by the two countries since 1983.

Speaking on the occasion Mrs Margaret Alva said that India had the benefit of the services of Soviet experts and coaches in various disciplines such as swimming, athletics, boxing, basketball, volleyball, wrestling, weightlifting, archery, etc. She pointed out that teams have taken part in national and international tournaments held in both countries.

She referred to certain new developments in this field like exchanges of coaches, exchanges of teams, friendly competitions, training of coaches, etc. She also stressed the development of the centre of excellence in Bangalore, for which equipments worth about Rs. 10 crores have been given.

Talking about India's plans in sports development, she said that sports had got no instant solution which could be produced in just

one year. This required recasting of plans, training programmes, which takes some time. What we have started now will probably bear results by 1990. She said that there had been a tremendous recasting of priorities to the whole approach to sports. "We are proud that we are trying to mass base sports in our country, infrastructure right down to the state, district and smaller levels and at the same time creating centres of excellence where those having talent may be identified and given opportunities," she said.

## Third University Contingent for Festival of India

The third contingent of 42 university students and officials from 7 universities will leave for Tashkent on September 1, 1987 for participation in the Festival of India in USSR. Tashkent is the venue of the third main inaugural function to take place on September 4, 1987. The Festival commemorates the 40th anniversary of Indian Independence and the 70th anniversary of the Great Socialist Revolution.

After participation in the inaugural ceremony on September 4 and visit to farms, industrial enterprises, schools and colleges on September 5, the Youth will disperse in three batches to three different regions of USSR from 6th September to 17th September.

Following university participants are included in this contingent

**Badhai Folk Dance** (Dr. Hari Singh Gour Vishwavidyalaya, Sagar): Usha Raj, Anupma Dube, Deep Shikha Tamrakar, Sapna Modi, Ajay Gupta, Sudhir Tiwari,

Like Spartakiad in the USSR and other Socialist and East-European countries, she said, India too had been doing something of a similar nature which was termed as *Bharatiyam*. It would be a continuing programme in India and would be development in nature and serve as a promotional avenue for mass sports programme. Mrs Alva expressed her gratitude to the Soviet Government for accepting Indian Government's request for deputing specialists for the skills in organising mass sports performance. She told that the first performance of *Bharatiyam* will be held in November this year in Kerala and a big programme had been planned for the Nehru centenary.

Madan Nanda, Deepa Pande, Krishan Lal, Sanjay Jadia, Moorat Singh, Chandra Kumar, Devi Prasad, and Shri V N Pathak (official).

**Chowlia Folk Dance** (University of Bombay): Samir Tanna, Ajay Kapasi, Asit Kerawala, Aroop Sharma, Babita Rochlani, Sujata Ghatalia, Depalee Doshee, Naisha Desai, Bhavdeep Jaipurwale, Husain Kharva and Indumati Lele, and Prof (Mrs) Lecna Vanmai.

**Group Song** (Dayal Bagh Educational Institute, Agra): Mamta Sharma, Rita Swami, Neeti Mishra, Mrityunjaya Mathur, Chota Madan Markan, Sukhdev Roy, K K. Upadhyay, Ravi Bhatnagar; Nandani Kumar and Dr. S B. Sharma (Official)

**Santoor Recital** (University of Jodhpur): Nikhil S. Bidwalkar and Yashwant Sharma.

**Seminar**: Janaki Vishwanath (Tata Institute of Social Sciences, Bombay), Renu Gonela (Andhra University), and Shipra Shiromeny (Agra University)

# News from Abroad

## The Karmarkar Algorithm

An algorithm, called Karmarkar algorithm invented by Dr Naren-dra K Karmarkar, an Indian Scien-tist in the United States, has been found extremely successful in solv-ing practical communications, busi-ness and network planning problems within no time.

Dr. Lakshman P Sinha, supervi-sor of the overseas network plann-ing group of the Bell Laboratories, who worked closely with Dr. Kar-makar, said that this algorithm could be successfully applied for properly scheduling the Indian Railways and studying the problems of Indian telecommunication net-work. Algorithm which are plans that guide computers through their given chores, are used to solve linear

programming problems.

He said the Karmarkar algo-rithm could solve a ten-year planning problem within four minutes. These are complex mathematical procedures that "steer" a compu-ter's operations through the geome-try of a large problem involving thousands of constraints and varia-bles

A linear programming algorithm called simplex method developed in 1947, has been in use so far to enable machines to handle complex problems. While the simplex method performed 10,000 arith-matic operations for one iteration-step-the Karmarkar algorithm could involve one lakh operations for one step

Dr. Lakshman said the Bell Laboratories used the Karmarkar algorithm to solve the complex problem of the pacific basin telecom-munication network. The problem was solved within minutes. Future planning sessions, by using the Kar-markar algorithm, might be able to engage in real time, inter-active planning, he said. This could dra-matically speed up the pace of planning.

Dr. Karmarkar, a graduate from the Indian Institute of Technology, Bombay, is a member of the techni-cal staff in the mathematical founda-tion of the computing department at Bell Laboratories, Murray Hill, New Jersey.

## We Congratulate . . .

Dr. Rajpal S. Sirohi, Professor and Head, Engineering Design Centre, Indian Institute of Techno-logy, Madras who has been elected Fellow of the Optical Society of America in recognition of his dis-tinguished service in the advance-ment of optics.

## THE TEACHERS' STRIKE

(Continued from page 1)

Then there is the grouse about the 7 point promo-tion scheme ; the Education Ministry does not appear to have put its case properly with reference to the alle-gation that IAS does not have any such gradation. It is well-known that an IAS officer joins in the junior scale ; then he secures the senior scale, the selection grade, the super time scale, and then the grade of the Additional Secretary and Secretary. Every year, he is assessed critically and is promoted to the next higher grade if found suitable. Nothing prevents those who wish to go in for the IAS to appear at the open compe-tition, which also has two steps ; the preliminary exami-nation and the final. The preliminary examination may be equated with the NTS scheme.

The same is true of military service. Here, the annual assessment is equally stiff. If the Educational Service has to acquire the same efficiency and image, there is no escape from continuous assessment.

In the aforesaid services, the assessment is made not only by peer groups but also by politicians, while in education, the assessment is made wholly by peer groups (national & international) and scholarship can-not remain long suppressed.

The third grouse is about in-service training. Suffice

it to say, that this too is an integral part of the deve-lopment and orientation of the cadres of the IAS as well as the armed forces. Knowledge is increasing at an incredible pace every year ; and the teachers shall lose nothing but gain a lot if they are asked to take in-service refresher and orientation courses periodically and share experience and thoughts in a relaxed and friendly atmosphere

Gunnar Myrdal ascribed India's low rate of progress to her being a 'soft' state, not in the sense that it was not a totalitarian state but in the sense that people per-formed their duties perfunctorily and at an easy pace. So if we mean to solve the problems facing millions of our less fortunate compatriots, let the teacher show the path of duty and attend to the tasks of scholarship, research & teaching for it is through scholarship, *tapas* and *yoga* that we shall redeem our constitutional pledge

Engaged as the nation is in a war against poverty illiteracy, insanitation, unemployment and now drought and floods, every minute counts and already we have lost millions of man-hours at the universities and colleges, which are the production centres of vital human resource for the country

# Funding of State Universities

## Some Crucial Issues

K. K. Balachander\*

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Mridula, *State Funding of Universities—A Study of Maintenance Grants to Universities*. Association of Indian Universities, New Delhi, 1985, pp xiii+187, Rs. 50.00

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Pursuing simultaneously the three goals quantity, equality and quality have introduced many perplexities in the Indian higher education system which have affected its size, character and means of finance. The policy-makers, it appears, had not examined, sufficiently in advance, the implications of expansion, especially on the financial front. The devising of appropriate methods of financing higher education (that takes into account the social objectives as well as qualitative upgradation) was brushed aside for long as a 'second order' problem in the discussions on higher education. It is heartening to see that educational finance, as a subject of enquiry, has been receiving in the recent past keen interest among academics, and a number of studies have come out dealing with this topic. There have been too many critiques, rather radical, arising mainly from the discipline of Economics, stressing the profound financial crisis in education, particularly higher education, and recommending a review of the existing patterns and producers of central and state government assistance for higher educational development. (As Mark Blaug rightly put it, perhaps the economists can throw more insights on this important issue which the non-economists are likely to miss! In this sense, therefore, the former still have a contribution to make to educational planning in less-developed countries). Considerable amount of research in this area has also been done, and is being done, in some universities and other reputed institutions, such as the Association of Indian Universities (AIU), the National Institute of Educational Planning and Administration (NIEPA), and the Indian Institute of Education. The monumental Education Commission Reports (1948-49 headed by Dr. Radhakrishnan and of 1964-66 headed by Dr. D.S. Kothari) had studied the problem of higher educational finances in detail and urged the need for many reforms in the system. The latter had rightly

emphasised the need for ironing out the *ad hocism* in financing university education and putting the institutions on sound footing under clearly laid down norms. At various conferences, workshops, seminars, etc. organised in recent years by the University Grants Commission (UGC), the AIU and some universities/research institutions, the problems relating to funding of higher education have been discussed threadbare. The proceedings (and the conclusions arrived at) of these academic meets do make one believe that *status quo* is not what is desired with regard to the present pattern of financing of higher education. The shortcomings of the existing system have been identified and the directions of change indicated. However, most of the studies conducted on this theme have been found to be analysing the pattern of financing for the system as a whole. There are problems of overall financing and also of relating to financing the different constituents of higher education, e.g. universities (central and state), colleges, IITs, Institutions of National Importance, etc., and this needs to be thoroughly investigated.

The book *State Funding of Universities* authored by Mridula makes a sincere attempt to fill the above gap. It is an indepth study of the formulae, processes, adequacy, efficiency, flexibility and equity aspects of the system of block/maintenance grant-in-aid to state universities. The study is based on the information/data provided by 57 universities and 9 state governments on the mechanism of financing (i.e. the system of grants-in-aid) for the years 1968-69 to 1979-80.

The author gives a good account of the patterns and procedures of financing state universities in India and examines in detail the implications of the existing grants-in-aid system to the financial conditions (and autonomy) of these universities. The issues raised by her are very important and some of the conclusions arrived at are worth taking seriously. The data

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\*Secretary-Technical Coordinator, Department of Economics, University of Bombay.

have been excellently sifted, and presented in an intelligent manner. In his Foreword to the book, Dr. Jagdish Narain emphasises broadly the author's three main conclusions: (i) The (state) university system has undergone a considerable change both in terms of enrolment-size and subject-specialisation, but the basis of funding of these institutions has not kept pace with this dynamics—in short, the existing system has outlived its utility on all counts. (ii) The pressure of social demand for university education and the cumbersome nature of the present mechanism of financing have been pulling the system in opposite directions. And (iii) there is an urgent need for reformulating the system of financing to these universities. In the Introduction, the author has skilfully emphasised the crucial importance of the problem in the context of development. The book is arranged into seven chapters (including Introduction), each of them bearing some thematic unity. Although each chapter provides useful information and analysis, the book's main strength lies in Chapters IV, V and VI. In Chapter IV, the problems of financing are discussed from the points of view of both the givers, i.e. the state governments, and the receivers, i.e. the state universities.

## II

What should be the principle of grants-in-aid from state governments to universities? What are the shortcomings of the present system of grants-in-aid and how can they be overcome? Are the grants satisfactory from the points of view of (a) resource-adequacy, (b) regulatory in resource-flow; and (c) financial flexibility/autonomy in resource-use? What constant factors should enter into the formulae for computing grants? How often should they be assessed and what should be the procedure of assessment? A carefully planned grants-in-aid system will surely go a long way in helping the higher educational institutions to carry out their obligations to society. It should be so framed that the following requirements are satisfied: (a) It should help in maintaining an overall planned, coordinated policy for higher educational development. (b) It should improve equalisation of higher educational opportunity which is considered as one of the 'external' effects or social benefits made possible by public expenditure on higher education. Also equality of opportunity will not be meaningful if there are unequal facilities for higher education in different states/regions in the country. Access to higher education should be enjoyed by prospective participants in all parts of the country equally. It may therefore be necessary to have a differential system of financial assistance to

prevent the occurrence of wider disparities with regard to provision of higher educational services and maintenance of standards between advanced and backward states/regions. (c) It should enable the institutions concerned to have a stable income. Frequent fluctuations (*ad hocism*) of grants will cause uncertainty in future planning. (d) The amount of grant should be adequate enough. Since the government now provides grants according to a set formulae, rising costs may *not* automatically get reflected in the provision of grants. The grants-in-aid policy should therefore be more flexible with provisions for periodic review so as to keep pace with normal growth in expenditure. Such a step would end the uncertainties, if any, and enable the institutions to devote themselves to the pursuit of their main tasks. It would also be desirable for an institution to be assured in advance that if it is asked to take more students, i.e. beyond the optimum size, and or required to extend its affiliating jurisdiction (in the case of the university), it could count on increased income. This is necessary as the present fee incomes are not adequate and private philanthropy is fast drying up. (v) It should be clear in its specifications. The nature and scope of 'admissible' and 'inadmissible' items of expenditure should not be a 'mystery'. It should clearly define the items of expenditure eligible for government grants, so that the institutions are left in no doubt in regard to the admission of these items for grant. This will also avoid divergent interpretations by officials. All vital and unavoidable items which are essential in the larger interests of the institutions and keep them at a reasonable level of efficiency, should be included in what constitutes the 'approved expenditure'. The conditions approved by the government should be liberal in such cases. (vi) All *committed* expenditures must be continued on a permanent basis. This may require proper coordination between the different grant-giving authorities. (vii) It should encourage diversity, experimentation and innovation. Institutions which show dynamism in this regard must be encouraged by special incentive grants. (viii) It should encourage the institutions to introduce economy in expenditure. It should have some in-built incentives for cutting costs and using resources efficiently. (ix) It should not be used as a lever to interfere with the normal functioning of institutions; it should not lead to such a situation that the institution may have to give up its autonomy in return for more state funds. (x) It should be such that it clearly specifies the financial responsibility of each partner—the government, the universities and students/parents. (xi) It should stimulate each institution to mobilize private (non-governmental) resources

needed for its proper development. If the institution succeeds in this effort, it should not mean that the government can absolve itself of its responsibility. (xii) It should promote academic excellence in institutions.

✶ The book provides valuable insight into, if not all, some of the above issues. Two important points highlighted in the study are the irregular flow of grants and their inadequacy. The state governments do not follow any systematic and proper policy in the allocation of funds to various universities. As the author states, "it is neither consistent nor based on any economic or educational indicators." In fact, there is a lack of appreciation of the real role of these institutions. The tendency is to look upon government allocation to these institutions as just 'expenditures' rather than as 'investment'. As a consequence, the emphasis appears to be more on 'regulation' than on 'development'. While the growth in the flow of government funds is under control, the growth in enrolment is not. Enrolments are guided by different sets of considerations which do not necessarily govern the flow of funds. There is no guarantee that the universities, particularly the already big ones, can count on increased income if they are asked (or rather pressurised) to take more students, and/or their affiliating jurisdiction is extended. Also the financial administration in the universities is gradually geared towards the rigid (and impersonal) practices and requirements of the state governments. The fact that this affects the hopes and aspirations of thousands of students and a good number of teachers is totally forgotten in the process. Many educationists who are sincere about the well-being of the system are finding it difficult to control the non-academic pressures that arise due to fiscal inadequacy. They view this crisis with considerable dismay, and compare it to the situation of the earlier golden age when funds were sufficient and institutional autonomy was assured in planning their budgets, and the government gave only broad guidelines. Further, much depends on the bargaining power of the Vice-Chancellor with the state government. And if the Vice-Chancellor happens to be a person belonging to the teaching profession with little or no administrative experience, when he/she goes to argue with the officials in the state department of education (or finance), it is quite likely to be an encounter between people speaking two different languages with no interpreter present. "Indeed, on this account", as Coombs rightly observes, "it is important for educational leaders to master not only their own field but the language and techniques of economists as well, in

order to be better armed for the defence of their own proposals in the annual 'battle of the budget' ! Good rhetoric is no substitute for facts and analysis in winning these battles".

All these attitudes have an adverse effect, not only on the implementation of academic programmes, but on the quality of plans themselves. The consequences of the lack of a clear-cut and imaginative approach to the funding of universities are indeed very serious. There appears to be no disputing against the above background of the urgent need for a thorough change of the present framework for the flow of grants to state universities.

### III

The author has stated that it was difficult to give a comparative picture of the financial positions of both 'state' and 'central' universities as of the latter, only 2 responded in giving full information (Chapter I). One wonders, however, whether any study of financing of universities would be complete without reference to central universities. There is a growing feeling that a strong pattern of uneven distribution of grants has prevailed as between these two types of universities. One would have also wished that the data relating to new and old (large) universities (established before 1900) had been subjected to further critical scrutiny and their ramifications brought out. The revenues of many universities belonging to the latter group have not increased much over the years owing to financial constraints resulting from inadequacy of government aid and the declining student contributions. Their chronic financial ailment is further aggravated by the new 'salary payment scheme' introduced in some States. Many of them may reach the point of bankruptcy in the not too distant future if their deficits continue to grow as they have been in recent times. Considering the vastness of their affiliating jurisdiction, the pressure of student numbers, the multiplication of courses and programmes (and examinations) and the increasing cost in conducting them, the larger number of teaching-cum-research departments for post graduate studies under them and the consequent increase in strength of teaching and administrative staff (and their becoming increasingly aware of their identity and role, and emerging as a strong force), etc., many old, big and reputed state universities deserve a better understanding from the state government (and the UGC) with regard to their maintenance and development grants.

The central universities which are receiving both maintenance and development grants from one single source, i.e. the UGC, are in a different position altogether. Though these universities (and their colleges) form a small part of the university system, both institutionwise and enrolmentwise, they are the beneficiaries of liberal grants. Why the reluctance to treat the state universities as an integral part of the national university system? Instead of looking upon the maintenance of these universities as just the business of the states concerned, the UGC could extend more help, either directly or indirectly, to alleviate some of the pressing and special problems faced by them. As a first step, the UGC should undertake a review of the working (and financing) of the state universities on the same lines as was done in the case of central universities recently.

#### IV

The study has dissected the problems faced by the state universities quite well, but in its attempt to draw policy conclusions at the end, it is rather weak. After finishing the book, therefore, one gets a feeling that many questions still remain unanswered. Some of them need special mention

1. In many countries with federal set-up and with a strong tradition of local control on university education, even in the absence of any constitutional obligations for that purpose, there is a growing realisation of the need for a substantial increase in Federal (Central) assistance. In India too, the Centre (through the UGC) could be associated more effectively in advising the state governments on enrolment policy, determining the question of maintenance grants to universities, and even on fixation of fee rates. The Education Commission (1964-66) had observed that an independent body like the UGC should periodically assess the financial needs of state universities, say for a period of 3-5 years, and this should form the basis for providing maintenance grants to them. Such a step, it was felt, would end the uncertainties, and enable these institutions to devote themselves fully to the pursuit of their main goals. The Report of the Committee on Governance of Universities and Colleges (1971) too had stressed the need for a closer collaboration between the government and the universities/colleges, and each respecting the complementary role of the other. It had further recommended that the UGC should be involved effectively in advising the state governments in determining the quantum of maintenance grants to these institutions. The Conference of Vice-Chance-

llors had recommended in 1975 that the Government of India should place at the disposal of the UGC sufficient funds to enable the Commission to pay maintenance grants for specified activities of state universities. It had also pleaded for more funds for their Plan development programmes. The Commission, if armed with more funds and powers, could extend maintenance grants to state universities on a selective basis for longer periods, say 10-15 years, or even on a permanent basis. Besides, each state, at present, is having its own grants-in-aid code with different approaches (and its inherent drawbacks). The UGC could bring about some semblance of uniformity in these matters now that education has been made a concurrent subject. Just as the UGC had framed a Model Act for universities in India a few years ago, a common or model grants-in-aid code could be framed for all universities.

2. While the question of finance should bring state universities into closer relation with the state government, the experience is that it is leading to tensions between the two. The problem is further complicated by the fact that university education is funded (and overseered) by more than one agency with diverse and conflicting objectives—often with objectives and no powers, and sometimes with powers but no objectives. The sources of funding to state universities (and their colleges) are found in a loose series of inter-relationships among the Planning Commission, the Union Ministry of Education and the UGC at the Centre, the Ministry of Education (and Finance) in the States and over 140 universities (and 5500 colleges). The patterns and procedures of grants-in-aid differ from one agency to the other, and the rationale behind them is not explicitly brought out. There has been a lot of overlapping too in their functions. In an ideal university system, the different fund-giving agencies should have a close relationship to one another so that it will be easy to introduce changes, if needed, in an orderly and smooth basis, and bring about the desired results. Lack of it in India has given rise to a number of problems. It is necessary to have a state level body which could act as a buffer, or a channel of communication between the state government and the UGC, and between them and the state universities. This body should assess periodically the financial needs of the universities in the state, determine the quantum of grants to them and ensure timely flow of funds. A representative each from the state education ministry and the UGC could be included in the proposed body. This will help smooth and effective implementation

at the state level of policies framed at the national level with the consent and cooperation of the state government concerned. This can also ensure that the development programmes already initiated during the earlier Plans in the universities are continued in full in future. The recent document on National Policy on Education (1986) has stated that "state level planning and coordination of higher education will be done through Councils of Higher Education. The UGC and these Councils will develop coordinative methods to keep a watch on standards." Perhaps the Council the Government of India plans to set up could perform the above functions too, and its terms of reference be widened accordingly.

3. At present there is no specific provision for education to the states in the context of the Finance Commission Awards even though in the process of reassessment of state non-Plan needs, the Finance Commission does consider the individual sectors' financial needs and the committed expenditure on schemes initiated in the previous plan under the Plan budget. However, the allocation of resources is done by Commission in *bulk* for all the activities of the state government, and not earmarked sector-wise. Under this arrangement, there is a likelihood of the funds meant for education (and higher education) getting diverted to other sectors in the non-Plan budget. Naturally, the programmes initiated by the UGC in the preceding Plan may suffer as the state governments may not make a provision for continuation of such programmes in the non-Plan budget. In actual practice, many state governments (and that includes some economically advanced ones too) have been dodging their responsibility of meeting expenditures incurred under the earlier Plan. For example, the Centres of Advanced Study set up in many state universities, which are supposed to serve as pacesetters in their respective fields and achieve 'peaks of excellence', can be continued on a regular basis only if the state governments agree to finance them permanently on a cent-per-cent basis after the Commission's assistance ceases. At the same time, such Centres located in central universities will not experience this kind of uncertainty as their financial needs are well looked after by the UGC on a regular basis. Although some state governments have adopted these Centres after considerable persuasion, the grants made are found to be inadequate causing in the process undue strains on the resources of the state universities. Sometimes only the posts—and that too teaching posts—approved earlier by the Commission (i.e. the salary part) for the Centres are consi-

dered for assistance by the state governments; for the non-salary part, which has also high academic value, and which is an integral part of the whole programme, grant is denied. The universities find it difficult to continue with these programmes as their own funds are very meagre. Naturally such activities face discontinuation once Commission's assistance stops. In view of this, there has to be some system of monitoring as to whether the stipulations of the Finance Commission are adhered to or not by the State Governments. Also considering the fact that the states are in different stages of development of higher education, and that their efforts and abilities vary, the Commission could more explicitly consider the requirements of this essential service in as much detail as possible for the different states in India while giving their awards. This will enable the economically weaker states to provide the benefits of higher education to their people comparable to those of other economically advanced states.

4. A study of the finances of some of the leading universities will reveal that the proportion of their internal resources to total income has been going down. Most of the universities have done nothing on their own to augment their resources; they live in the hope that ultimately the government will come to their rescue, and this does not just happen. The universities should make sincere efforts to establish a closer rapport with the community, and not live in an environment of exclusiveness. They have to see that the community is made aware of the constraints, pressures and challenges being faced by them. Also many parents/students have no clear idea of the cost involved in providing courses in universities. If they are provided with adequate information, there will be a sea change in the debate on the question of raising fee rates and a mutually acceptable solution to the problem can be found. It can be resolved satisfactorily only by the total involvement of the faculty, students and their guardians/parents.

5. The state governments cannot be held wholly responsible for the present financial ills that infest the universities. Perhaps there is an element of truth in the statements made by the State Education Ministry officials that there is a lack of financial discipline in universities, and that their financial management is very poor (Chapter IV). The universities could make better efforts to get most out of the resources by optimum and efficient use, and avoid all institutional extravaganza and cosy facilities. They have to find out which of their operations are absorbing large part of the resources and which ones

have considerable potential for economics as a result of increased efficiency. While the state governments (and the UGC) should become more alive to the claims of the universities on public revenues, the latter too, on their part, could become more cost conscious and priority minded. Some general criteria for effective management and budgeting of universities have to be developed. While preparing the annual budgets, very few universities relate it to any overall plan designed to move them towards their objectives. Very little research has been conducted on these aspects—the field remains mostly unexplored. So far the pressure has been on quantitative expansion, not management efficiency. As the system has grown bigger, so also its complexities and problems. There is a feeling among the academics that the vast administrative machinery in universities, particularly in large ones, has become very slow, and is getting more absorbed with routine administration than academic matters. Rules are used not as an aid but as road blocks to real academic activities. Some of the reforms suggested above may need little monetary investment; they may require only more human effort and ingenuity. Also the universities could aim at a certain degree of involvement on the part of academics with senior responsibility in university administration. Unless the community is convinced that the funds provided are being utilised in the best possible manner, and the university affairs are being conducted in an integrated, meaningful and fair manner, it will not volunteer with help. Some amount of self introspection is necessary on the part of those engaged in the university system.

## V

A well-conceived policy of development of university education is lacking under the present system of state government assistance to their universities (and to colleges). Over the years, a system almost totally dependent on the government has been created and the consequences have to be faced. The state (and central) government cannot now eschew their responsibilities. There is no justification for denying adequate funds to institutions that have already been permitted to come into existence. They should not be left in the lurch languishing for funds. As far as future expansion is concerned, the government can limit it to the level of resources/facilities available in the country; in fact, the New Education Policy document of the Government of India has stated that, in future, the emphasis would be on consolidation and diversification of existing institutions of higher education and that new institutions would be set up

only where absolutely necessary. This policy should prevent the unsatisfactory and alarming situation in the higher education sector resulting from government funds getting spread thinly over too many points, deteriorating physical facilities and erosion in academic standards. If the state universities are relieved of their immediate as well as long-term financial woes, they can devote their undivided attention to 'academic excellence' which the society expects of them.

In this rather long review, an attempt has been made to bring out the salient aspects of the book *State Funding of Universities*. The preceding paragraphs should not in any way detract from the overall usefulness of the book. The book is an important contribution towards a better understanding of the various facets of funding of state universities in India. It deserves a careful reading by policy-makers, university authorities and scholars in the field. □

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September 18-21, 1987	National Seminar on Energy Education	To discuss various aspects of energy education—meaning and scope, resources, institutionalisation, teacher preparation, curriculum development, and role of mass media.	Department of Education, Rohilkhand University	Dr Beena Shah, Organising Secretary, NASEEZ, Department of Education, Rohilkhand University, Bareilly-243 001, U P.
Sept 21 - Oct. 4, 1987	Training Course in Research Methodology in Geography	To expose the participants to research methods in Geography and quantitative and cartographic techniques employed in Geographical research	Department of Earth Sciences, Manipur University, Imphal.	Dr. R.P. Singh, Department of Earth Sciences, Manipur University, Imphal.
October 5-9, 1987	Short-term Course on Advanced Image Processing for Remote Sensing.	To appraise the scientists/engineers, working in the area of Image Processing and its Applications to Remote Sensing, regarding techniques, developments and future trends in the field of Image Processing.	Indian Space Research Organisation (ISRO) in collaboration with IIT, Bombay	Dr. T.V. Pavate, Chief Project Engineer [CSRE], Principal Programme Coordinator (Training), ISRO-IIT (Bombay) Space Technology Cell, CSRE Building, Indian Institute of Technology, Powai, Bombay, 400 076.
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December 18-19, 1987	National Conference on Role of Universities in Implementation of New Education Policy.	The Conference will focus on Management of Higher Education, Improvement in Efficiency and New Strategies in Higher Education vis-a-vis New Education Policy	Association of Indian Universities in collaboration with Osmania University, Hyderabad.	Dr. V. Natarajan, Project Director (Exams) Association of Indian Universities, 16, Kotla Marg, New Delhi-110002

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One of the important functions of the Association of Indian Universities is to act as a clearing house of information on higher education in the country. Towards this end the AIU Library is engaged in collection building and developing instruments for the dissemination of research information. Over the years a valuable collection of books and documents on different aspects of higher education has been acquired.

The Library has also developed Bibliography of Doctoral Dissertations as an effective tool in the dissemination of research information. Retrospective bibliographies covering the period 1857-1970 and 1970-75 were the first to appear. Effective 1975, however, the bibliography is issued annually in two volumes. One volume deals with Natural and Applied Sciences while the other records doctoral degrees awarded in Social Sciences and the Humanities. In addition to the normal bibliographical details like the name of the Research Scholar, the title of the thesis, years of registration for and award of the degree, and the name of the University accepting the thesis for award of a doctoral degree, the bibliography also gives name and complete address of the supervising teacher and an availability note that seeks to inform whether a copy of the dissertation is available for consultation and use in the University Library/Department or Registrar's Office.

The columns 'Theses of the Month' and 'Research in Progress' are intended to cut out the time lag between the receipt of information and its inclusion in bibliography. Such Universities as are not sending us regular information in respect of Doctoral Theses accepted and research scholars enrolled are welcome to make use of these columns.

The Library is open from 9.30 a.m. to 5.30 p.m. Monday through Friday.

## RESEARCH IN PROGRESS

### A List of Research Scholars Registered for Doctoral Degrees of Indian Universities

#### PHYSICAL SCIENCES

##### Physics

1. Abraham, Susan. *Studies on directional solidification of alloys*. Kerala. Dr. V.K. Vaidyan, Dr. K.G. Satyanarayana and Dr. B.C. Pai.
2. Bharti, Rachana. *Correlation functions in condensed systems*. Delhi. Prof. S.P. Tewari
3. Das, Prantosh Kumar. *Laser-plasma interaction*. Delhi. Dr. M.P. Srivastava.
4. Joshi Hira. *Electron correlation in condensed systems*. Delhi. Prof. S.P. Tewari.
5. Pahwa, Anita. *Body aura and spectroscopic studies on macromolecular systems*. Delhi. Dr. Madan Mohan Bajaj
6. Prasad Saurabh. *Investigations on some aspects of nuclear structure through quark model*. Delhi. Dr. V.S. Bhasin.
7. Sharma Purnima. *Studies on thin films using surface acoustical waves and electrical techniques*. Delhi. Prof. Abhay Man Singh.
8. Singh Shashi Shankar. *Studies of low latitude ionospheric F region*. Delhi. Prof. J. N. Tandon and Dr. B. C. N. Rao.
9. Srivastava, Rama. *Electrical and acoustical properties of oxide films*. Delhi. Prof. A. Mansingh.
10. Ushakumari, L. *Studies on directional solidification of alloys*. Kerala. Dr. V.K. Vaidyan, Dr. K.G. Satyanarayana and Dr. B.C. Pai.

##### Chemistry

1. Agrawal, Poonam. *Co-ordination compounds of 2-substituted thiazoles and related ligands*. Banasthali. Dr. A.I.P. Sinha.

2. Amir Aminifar. *Kinetics and mechanism of Industrially important reactions of substituted phenols with ketones and aldehydes*. Delhi. Dr. H.C. Malhotra

3. Harpal Kaur. *Studies of alkali & alkaline earth cation complexes*. Delhi. Dr. Ramesh Chandra.

4. Jha, Sanjay Kumar. *Coordination chemistry*. Delhi. Dr. S.K. Sindhwani.

5. Jose, T.M. *Correlation between the nature of the polymer matrix and reactivity of attached functional groups in polymeric reagents*. Gandhiji. Dr. V.N. Rajasekharan Pillai.

6. Karakkattu, John K.J. *Synthetic and mechanistic studies using polymeric oxidising and brominating reagents*. Gandhiji. Dr. Rajasekharan Pillai

7. Manju Bala. *Complex compounds of Schiff bases derived from polyheterocyclic amines*. Banasthali. Dr. A.I.P. Sinha.

8. Padmalata, M. *Studies on materials of importance & a study of solar energy storage in chemical compounds*. Delhi. Prof. S. Lahiry.

9. Puntambekar, U.S. *Transformation of plants*. Shivaji. Dr. P.K. Ranjekar.

10. Ramachandran, P.R. *Synthetic and mechanistic studies using crosslinked polymeric active esters*. Gandhiji. Dr. V.N. Rajasekharan Pillai.

11. Sawalkar, S.D. *Synthesis of biologically active compounds- $\beta$ -lactams*. Shivaji. Dr. N.R. Ayyangar

12. Sreekumar K. *Polymeric analogues of t-butyl hypophosphites as solid phase reagents*. Gandhiji. Dr. V.N. Rajasekharan Pillai.

13. Sudarsana Kumar, M.R. *Metal complexes with oxygen donor ligands*. Kerala. Dr. C.G. Ramachandran Nair.

14. Sukumaran Nair, K.P. *Effect of topographical nature of the polymer matrix in polymer supported solid phase acylations.* Gandhiji. Dr. V.N. Rajasekharan Pillai.

15. Zacharias, Jose. *Polymer supported phase transfer catalysis using immobilised poly ethylene glycol derivatives.* Gandhiji. Dr. V.N. Rajasekharan Pillai.

#### Earth Sciences

1. Banerjee, Amit. *Micropalaeontology.* Delhi. Dr. Prabha Kalia.

2. Banerjee, Indrajit. *Geochemistry* Delhi Prof. G. S. Roonwal.

3. Bhatnagar, Anurag Sahal. *Geology and geochemistry of Proterozoic carbonates.* Delhi. Dr. D.M. Banerjee.

4. Bhattacharya, Debashis. *Aspects of metallogenesis in the Toghian igneous complex, Haryana.* Delhi. Dr. M. Deb.

5. Jagirdar, Mudan. *Sedimentology and applied geology.* Delhi. Dr. V. Jhingran.

6. Mishra, Shobhita. *Petrological investigations in the Chor Area in Western Himalaya.* Delhi. P.K. Verma.

7. Panda, Ajit Kumar. *Felsic magmatism and mineralisation in South Central Rajasthan.* Delhi. Dr. Mihir Deb.

8. Pant Kamal. *Geology of a part of Garhwal-Kumaun Himalaya.* Delhi. Prof. P.S. Saklani.

9. Salim, M.B. *Integrated environmental capacity assessment for land-use development and conservation: A case study of Aralampuzha-Bavalipuzha river basin, North Kerala* Kerala. Dr. R.S. Iyer

#### Engineering and Technology

1. Goudarzi, Daryoush Amir Sardari. *Some studies on MIG welding of precipitation hardening on aluminium & zinc alloy.* Delhi. Prof. Rajnish Prakash and Dr. S. Pandey

2. Isaac, Jayakumari. *Crystal growth and related problems.* Gandhiji. Dr. M.A. Ittyachan

3. Varzghani, Benzarjomani-Faraji. *Alternative fuels for internal combustion engines* Delhi. Dr. S.P. Reddy and Dr. V.S. Susarla

4. Varghese, George. *Growth and study of europium compound crystals* Gandhiji. Dr. M.A. Ittyachan.

### BIOLOGICAL SCIENCES

#### Marine Biology

1. Miranda, P. Ignatius. *Parasites and diseases of shell fishes of the South-West Coast of India* Kerala. Dr. S. Radhakrishnan.

2. Radhakrishnan, C. *Studies on the biology and fishery of an elasmobranch.* Kerala. Dr. C.M. Aravindan.

#### Microbiology

1. Banarsi Dass. *An experimental approach to develop a method for estimation of relative potency of Russell's viper anti-venom serum* H.P. Dr. S.N. Saxena.

2. Rajesh Kumar. *Development of an improved pertussis Vaccine.* H.P. Dr. S.N. Saxena.

#### Bio-Chemistry

1. Abraham Rita. *Effect of dietary factors and pathological conditions on the metabolism of very low density lipoproteins.* Kerala. Dr. P.A. Kurup and Dr. P.R. Sudhakaran.

2. Deepa Rani, K.R. *Effect of exposure of the mother to cigarette smoke on the metabolism of lipids and macromolecular components in the young ones using experimental animals.* Kerala. Dr. P.L. Vijayammal.

3. Helen Joy, B.H. *Effect of feeding atherogenic diet to the mother on the metabolism of lipids and macromolecular components in the young ones using experimental animals.* Kerala. Dr. P.L. Vijayammal.

4. Jaya, G.S. *Metabolism of lipids and glycoconjugates in alcohol treated rats* Kerala. Dr. Venugopal P. Menon.

5. Kuriakose, Rosh V. *Nutritional evaluation of the drum stick pods, Moringa oleifera a favourite food item of Indian vegetarians* Kerala. Dr. K.T. Augusti.

6. Prabhakaran, Shakuntala. *Biochemical changes in pesticide toxicity in rats.* Kerala. Dr. K. Saraswathi Devi.

7. Sheela C.G. *Biochemical studies on the effects of S-allyl cysteine sulfoxide isolated from garlic, Allium sativum Linn* Kerala. Dr. K.T. Augusti

8. Suresh Kumar, J.S. *Metabolism of lipids and glycoconjugates in myocardial infarction associated with diabetes.* Kerala. Dr. Vanugopal P. Menon.

9. Suresh Kumar, N. *Metabolism of very low density lipoproteins in primary cultures of rat hepatocytes.* Kerala. Dr. P.A. Kurup and Dr. P.R. Sudhakaran.

10. Vijayalakshmy Amma, K.S. *Effect of administration of antibiotics on the metabolism of lipids and glycoconjugate.* Kerala. Dr. S. Leelammal.

#### Botany

1. Inderdeep Kaur. *Developmental, histochemical and ultrastructural studies on Indian seaweeds* Delhi. Prof. M.R. Vijayaraghavan.

2. Kuriakose, Neena. *Physiological and biochemical studies of stress tolerance and secondary metabolism using tissue and organ culture techniques* Delhi. Dr. P.S. Ganapathy.

3. Kurlapkar, D.D. *Studies on the mangrove ecosystems of Western Maharashtra* Shivaji. Dr. (Smt.) L.J. Bhosale.

4. Negi, Sushmita. *Reproductive biology of flowering plants.* Delhi. Dr. R.N. Kapil and A.K. Bhatnagar.

5. Singh, Inderjit. *Ecological responses of some plant species with emphasis on nutrient cycling and allelopathy.* Delhi. Dr. K.M.M. Dakshini.

#### Zoology

1. Inamdar, Shakera Amir. *Biosystematics studies in braconid parasitoids of some economic importance crop pests in Western Maharashtra.* Shivaji. Dr. T.V. Sathe.

2. Ingawale, D.M. *Studies of hymenopterous parasitic complex associated with lepidopterous pests on cotton.* Shivaji. Dr. T.V. Sathe.

#### Medical Sciences

1. Mishra, Yogendra. *Pharmaceutical chemistry & pharmacology* Delhi. Dr. D. Zafar and Dr. S.P. Agarwal.

2. Popli, Harvinder. *Novel drug delivery system for steroid drugs.* Delhi. Dr. S.N. Sharma.

# THESES OF THE MONTH

## A List of Doctoral Theses Accepted by Indian Universities

### PHYSICAL SCIENCES

#### Mathematics

1. Gauri Kumar. *Some types of affinity connected and Riemannian spaces.* Calcutta
2. Katkar, Shivram Onkar. *Models for self gravitating and magnetic stars with variable density.* Nagpur.
3. Sarkar, Manigopal. *On some information theoretical and statistical models in statistical physics.* Calcutta.

#### Statistics

1. Dwivedi, Sada Nand. *Some probability models for analysis of birth interval data.* BHU.
2. Suryanarayana, Jayanthi. *Stress-strength and allied reliability models.* Osmania.

#### Physics

1. Bhikshamiah, G. *Microstructural parameters and Debye temperatures of Ag-Cd-Zn and Cu-Al alloys.* Osmania.
2. Dev Anand. *Inclusive production of hadrons in Kp interactions at high energies.* Jammu.
3. Ghosh, Biswanath. *Cosmic rays at sea-level (26°N, 79°E).* North Bengal.
4. Majumdar, Prakash Vasantao. *Ray absorption spectroscopic studies of some cobalt-systems.* Nagpur.
5. Mukunthan, A. *Spectroscopic studies on polyatomic molecules.* Anna
6. Suryanarayana, Challa. *Studies on internal conversion coefficients characterizing high multipole electro-magnetic transitions.* Andhra

#### Chemistry

1. Basu, Dipankar. *Chemistry of some north east Indian plant products.* Calcutta.
2. Bhattacharyya, Saradindu. *Studies on the analytical aspects of chelating resins.* Calcutta.
3. Chakraborti, Keya. *Solvent effect on excimer emission.* Calcutta
4. Chaudhari, Uday Rajeswar. *Kinetic and analytical studies of oxidation of industrially important products, viz. tannic acid, cellulose derivatives and poly (vinyl alcohol) with ammonium-1-hexanitratocerate (I).* Nagpur.
5. Halesha, R. *B<sub>1</sub> and polynuclear complexes of rhodium and iridium with nitrogen heterocycles as bridging ligands.* Bangalore.
6. Jain, Rajni. *Synthesis of naturally occurring highly oxygenated flavonoids and phytochemical studies of Tephrosia species.* Delhi.
7. Jam, Rajshree. *Chemical and antimicrobial studies of natural products.* HS Gour.
8. Kaila, Neelu. *Synthesis of some heterocyclic compounds derived from chalcones and  $\beta$ -diketones as potential antifungal and antibacterial agents.* Delhi.
9. Merwade, Aravind Yekanathsa. *Studies in the indole field: 3-phenylindole derivatives of pharmacological interest.* Karnatak.

10. Meshram, Harshadag Mitaram. *Organic chemistry of nitrogen and sulphur containing compounds - Synthesis of new N-glucosylated formamidinas and related compounds.* Nagpur.

11. Mukhopadhyay, Snigdha. *Organic thioligands as chelating agents in the spectrophotometric determination of platinum metals.* Calcutta

12. Murthi, Mango. *Studies in alicyclic system.* North Bengal.

13. Patel, Mayur Bhanubhai. *Interpenetrating polymer networks from renewable resources: Castor oil.* Patel.

14. Patel, Natvarlal Khodidas. *Mechanical properties of polymers.* Patel

15. Rajeshwar, Kukatla. *Syntheses of heterocyclic steroids.* Osmania

16. Roop Narain. *Treatment of effluent from chemical industries.* Nagpur.

17. Samal, Prakash Chandra. *Pathways in chromic acid oxidations.* Berhampur.

18. Sharma, Digish Kumar. *Study of the electroreduction of organic compounds at different metal electrodes.* Rajasthan

19. Shobha Rani, J. *Studies on the structural features of micelles of conventional and of functionalized surfactants.* Osmania.

20. Sinha, Shekhar Kumar. *Studies on N-arylbenzimidoyl chloride derivatives as analytical reagents.* Ravishankar.

21. Syed Yousuf Ali. *Investigations of dioxygen complexes of platinum group metal ions with EDTa and some secondary ligands in aqueous medium.* Osmania

22. Taneja, Poonam. *Studies in the synthesis of new heterocycles including some mesoionic.* Rajasthan.

23. Uma, Kadiyala. *Studies on reducibility and dispersibility of supported nickel catalysis.* Osmania

#### Earth Sciences

1. Alam, Md Mahmood. *Geology & petrochemistry of Barakar measure coals of Jharia Coal Field.* Bihar, ISM

2. Bejarniya, Bhawana Ram. *Stratigraphy and tectonics of the precambrian rocks of the Kabilalakhawali Roma Triangle, North of Udaipur City, Rajasthan.* Rajasthan

3. Paramjit Singh. *Microstructure, mineralogy and geochemistry of Indian vertebrates with special reference to the Siwalik vertebrates assemblages from the Pinjore formation of Himachal Pradesh and Haryana.* Panjab.

4. Rameshwar Rao, D. *Geochemistry & mineralogy of high grade rocks in the transition zone in Dharmapuri District, Tamil Nadu, India.* Osmania.

5. Sugriva Reddy, A G. *Studies on the alkaline complex at Podili in Prakasam District, A P.* Osmania

#### Engineering & Technology

1. Sanavullah, M Y. *Study of interior and exterior electrostatic field problems using finite element method.* Anna.

2. Venkateswarlu, Vellanky. *Geomechanics classification of coal measure rock vis-a-vis roof supports.* ISM.



## MINISTRY OF DEFENCE DEFENCE RESEARCH & DEVELOPMENT ORGANISATION

**Challenging and Rewarding Career Opportunities in Defence  
Research and Development Organisation (DRDO)**

Advt. No. 013/RAC, 87

*The DRDO undertakes research and development projects in its various labs to meet multifarious needs of Armed Forces. Excellent career opportunities offering a challenging and rewarding work experience are available in a wide spectrum of disciplines. Labs with updated research and development facilities are located in Delhi, Bangalore, Pune, Hyderabad, Dehradun, Cochin, Visakhapatnam, Balasore, Bombay, Gwalior, Jodhpur etc.*

*Applications from candidates with aptitude for R & D work are invited for the following posts.*

**Scientist 'F' (Rs. 5100-6300) — 3 Posts**

**Item No 1 (Aerospace Surveillance Warning and Control (ASWAC) Project Office, Bangalore)—1 Post**

The Scientist 'F' at ASWAC is required to provide high calibre scientific leadership for Aeronautics and Avionics oriented activities for the Project Office at Bangalore. The job involves integration of varied work-packages of radar, communications and associated system. The applicant must be conversant with latest development in Aeronautics and Avionics (including Radar/Communication) techniques. He should also have the experience of coordinating and monitoring multi-disciplinary and multipurpose developmental projects/programmes and should be capable of ensuring man-machine and overall integration and operational exploitation of a major system to meet service environment. The individual should also possess ability to interact creatively with other R&D institutions and user agencies in the Country and should have capacity to evolve innovative and creative solutions to problems. He should be able to inspire team efforts through his breadth of knowledge related to application of technology for Defence.

**Essential Qualifications:** (i) At least second class Bachelor's degree in Mechanical/Aeronautical Engineering from a recognised University or equivalent. (ii) Ten years' research or design or development experience in the areas of systems maintenance and reliability studies and airborne systems engineering, of which at least three years should have been in a responsible position dealing with R&D Projects in the above mentioned areas. **Desirable Qualifications:** Master's Doctorate degree in Mechanical, Aeronautical Engineering.

**Item No. 2 (Institute of Armament Technology, Pune)—1 Post**

**Essential Qualifications:** (i) At least second class Bachelor's degree in Computer Engineering from a recognised University or equivalent. (ii) Ten years' research or design or development experience in the field of computer hardware and software of which at least five years should be in teaching at P.G. level in a reputed institution. **Desirable Qualifications:** (i) Master's/Doctorate degree in Computer Engineering. (ii) Candidates with interest/knowledge of CAD, AI and experience in guiding students for M.Tech Ph.D degrees will be preferred.

**Item No. 3 (Institute of Armament Technology, Pune)—1 Post**

**Essential Qualifications:** At least second class Bachelor's degree in Electronics/Telecommunications engineering from a recognised university or equivalent. (ii) Ten years' research or design or development experience in the field of Microwave antennas and related areas of which five years should be at Post Graduate level in reputed institutes. **Desirable Qualifications:** (i) Master's/Doctorate degree in the field of Antennas or electromagnetics and publications in the connected fields. (ii) Candidates having knowledge/experience in using antenna test ranges, anechoic chambers etc. for

evaluation of antenna, determination of radar cross section of models and guiding of students for M. Tech/Ph. D degrees will be preferred.

**Scientist 'D' (Rs. 3700-5000)—4 Posts**

**Item No. 4 (Naval Physical & Oceanographic Laboratory, Cochin)—1 Post**

**Essential Qualifications:** At least second class Bachelor's degree in Electronics Electrical Engineering from a recognised University or equivalent. (ii) Eight years research or design or development experience in the field of CRT-based graphic display systems and display processing techniques out of which at least four years in interactive/computer graphics hardware design employing state of the art VLSI. **Desirable Qualifications:** Master's degree in Electronics/Electrical Engineering.

**Item No 5 (Naval Physical & Oceanographic Laboratory, Cochin) — 1 Post**

**Essential Qualifications:** At least second class Master's degree in Physics, Applied Physics or Bachelor's degree in Mechanical Engineering from a recognised University or equivalent. (ii) Eight years' research or design or development experience related to acoustic calibration facility and testing of transducers. **Desirable Qualifications:** Doctorate degree in Physics/Applied Physics.

**Item No. 6 (Institute of Armament Technology, Pune)—1 Post**

**Essential Qualifications:** At least second class Bachelor's degree in Electronics/Telecommunication engineering from a recognised University or equivalent. (ii) Eight years' research or design or development experience in the areas of microwave antennas, design and development and their evaluation. **Desirable Qualifications:** (i) Master's degree in Electronics/Telecommunication Engineering with publications in reputed journals in the area of microwave antennas and related topics. (ii) Candidates with knowledge of Radar Cross Section studies and evaluation will be preferred.

**Item No. 7 (Institute of Armament Technology, Pune)—1 Post**

**Essential Qualifications:** (i) At least second class Bachelor's degree in Electronics or Master's degree in Physics from a recognised University or equivalent. (ii) Eight years' research or design or development experience in the field of Lasers and Electro-optics of which at least three years should be teaching of Graduate Post Graduate level students in a reputed Post Graduate Institution.

**Desirable Qualifications:** (i) Master's/Doctorate degree in the field of Lasers and electro-optics and publications in related areas. (ii) Candidates with experience in guiding of students for M. Tech. and Ph. D will be preferred.

**Scientist 'C' (Rs. 3000-4500)—9 Posts**

**Item No. 8 (Defence Laboratory, Jodhpur)—1 Post**

**Essential Qualifications :** (i) At least second class Master's degree in Physics with specialisation in Nuclear Physics from a recognised University or equivalent. (ii) Four years' research or design or development experience in radiation safety and environmental monitoring. **Desirable Qualifications :** Doctorate degree in Nuclear Physics or Post-Graduate Diploma in Radiological Physics with experience in radiation safety.

**Item No. 9 (Defence Laboratory, Jodhpur)—1 Post**

**Essential Qualifications :** (i) At least second class Bachelor's degree in Electronics Engineering or Master's degree in Physics with specialisation in Electronics from a recognised University or equivalent. (ii) Four-year's research or design or development experience in the field of computer applications in Nuclear Instrumentation. **Desirable Qualifications :** Doctorate degree in Nuclear Physics or Nuclear Instrumentation or Master's degree in Electronics Engineering with experience in software development.

**Item No. 10 (Defence Laboratory, Jodhpur)—1 Post**

**Essential Qualifications :** (i) At least second class Bachelor's degree in Electronics or Computer Engineering from a recognised University or equivalent. (ii) Four years' research or design or development experience in the field of Micro-processors and computer electronics or computer software development. **Desirable Qualifications :** Master's degree in Electronics, Computer Engineering

**Item No. 11 (Defence Laboratory, Jodhpur)—1 Post**

**Essential Qualifications :** MBBS—A medical qualification included in the First Schedule or the Second Schedule or Part II of the Third Schedule to the Indian Medical Council Act 1956 (102 of 1956). Holders of Medical qualifications included in Part II of the said Third Schedule should also fulfil the conditions specified in sub-section (3) of Section 13 of the said Act. (ii) Required Post-graduate degree qualification. (iii) Three years practical experience in radiation medicine or radiosotopic applications.

**Item No. 12 (Defence Laboratory, Jodhpur)—1 Post**

**Essential Qualifications :** (i) At least second class Master's degree in Physics with specialisation in Microwave from a recognised University or equivalent. (ii) Four years' research or design or development experience in Microwave area. **Desirable Qualifications :** Doctorate degree in Microwave Physics.

**Item No. 13 (Defence Laboratory, Jodhpur)—1 Post**

**Essential Qualifications :** (i) At least second class Master's degree in Micro-biology or Bio-chemistry from a recognised University or equivalent. (ii) Four years' research or design or development experience in water Microbiology water quality monitoring/water pollution. **Desirable Qualifications :** Doctorate degree in Micro-biology or Bio-chemistry.

**Item No. 14 (Institute of Armament Technology, Pune)—1 Post**

**Essential Qualifications :** (i) At least second class Master's degree in Physics or Bachelor's degree in Electronics Engineering from a recognised University or equivalent. (ii) Four years' research or design or development experience in the area of Lasers and Electro-optics of which two years should be teaching at Graduate/Post Graduate level in a reputed institute. **Desirable Qualifications :** (i) Master's/Doctorate degree in Electronics Engineering/Physics with Publications. (ii) Candidates with practical experience in Holography and Design Development and Fabrication of Lasers and setting of experiments with them will be preferred.

**Item No. 15 (Naval Physical & Oceanographic Laboratory)—1 Post**

**Essential Qualifications :** (i) At least second class Bachelor's degree in Electronics/Electrical Engineering from a recognised University or equivalent. (ii) Four years' research or design or development experience of hardware for CRT Display systems with knowledge of computer/Microprocessor based graphics techniques and display hardware. **Desirable Qualifications :** Master's degree in Electronics/Electrical Engg.

**Item No 15-A—1 Post**

**Essential Qualifications :** (i) At least Second class Master's degree in Chemistry from a recognised University or equivalent. (ii) Four year's research or development experience in the field of synthesis of characterisation of organometallic compounds. **Desirable Qualifications :** Doctorate degree in the fields of Synthesis of Organometallic compounds with knowledge of handling of NMR instrument and interpretation of its results

**Scientist 'B' (Rs. 2200-4000)—12 Posts**

**Defence Research & Development Laboratory, Hyderabad)**

**Item No 16—4 Posts (UR-2, SC-1 & ST-1)**

**Essential Qualifications :** (i) At least second class Bachelor's degree in Engineering from a recognised University or equivalent. **Desirable Qualifications :** M B A with knowledge of Computer Programming and aptitude for project management

**Item No 17—2 Posts (UR-1 & SC-1)**

**Essential Qualifications :** (i) At least second class Master's degree in a Science subject including Mathematics or second class Bachelor's degree in Engineering from a recognised University or equivalent. (ii) Post-graduate degree or diploma in Library Science or Associateship of INSDOC/DRTC M Lib/B Lib Sc from a recognised University or equivalent

**Item No 18 (Defence Bio-engineering and Electro Medical Laboratory, Bangalore)—2 Posts (UR-1 & SC-1)**

**Essential Qualifications :** At least second class Master's degree in Physiology with specialisation in Ergonomics Human Engineering from a recognised University or equivalent. **Desirable Qualifications :** Doctorate degree in Physiology

**Item No 19 (Institute of Nuclear Medicine & Allied Sciences, Delhi)—1 Post (UR)**

**Essential Qualifications :** At least second class Master's degree in Genetics from a recognised University or equivalent. **Desirable Qualifications :** Doctorate degree in Genetic or Research experience in Molecular Genetics of Radiation Biology.

**Item No 20 (Institute of Nuclear Medicine & Allied Sciences, Delhi)—1 Post (Reserved for SC)**

**Essential Qualifications :** At least second class Master's degree in Bio-Physics from a recognised University or equivalent. **Desirable Qualifications :** Doctorate degree in Bio-physics or experience in Theoretical Biology.

**Item No 21 (Institute of Nuclear Medicine & Allied Sciences, Delhi)—2 Posts (UR - 1 & SC-1)**

**Essential Qualifications :** At least second class Master's degree in Bio-Physics or Bio-chemistry from a recognised University or equivalent. **Desirable Qualifications :** Doctorate degree in Bio-physics or Bio-chemistry with experience in NMR-Spectroscopy or Cell Biology or Flow-cytometry.

## GENERAL CONDITIONS

1. **Promotion Prospects :** DRDO offers excellent opportunities for career advancement. Result Oriented motivated Scientists can look forward to promotions to following grades of Scientists :

Scientist 'C' Rs. 3000-4500/-, Scientist 'D' Rs. 3700-5000/-, Scientist 'E' Rs. 4500-5700/-, Scientist 'F' Rs. 5100-6300/-, Scientist 'G' Rs. 5900-7300 -

2. **Age Limits :** (i) For Scientist 'B' not exceeding 28 years; (ii) Scientist 'C' not exceeding 35 years (iii) For Scientist 'D' not exceeding 45 years. (iv) For Scientist 'E' not exceeding 50 years. Crucial date for determining age is 15 September, 1987. Relaxation of age limit of 5 years is admissible for SC/ST candidates and Govt. servants

3. **Method of Applying** Neatly type-written applications on the prescribed application format should be sent to Director, Recruitment & Assessment Centre, Room No. 225 'B' Wing, Sena Bhavan, New Delhi-110011, preferably by Registered cover superscribed 'Application for the post of Scientist' 'Item No.' on plain paper in the prescribed format reproduced below) accompanied by a crossed non-refundable postal order of the value of Rs. 8 - drawn in favour of Senior Accounts Officer, Recruitment & Assessment Centre, DRDO, payable at New Delhi. There is no fee for SC/ST candidates. Last Date of receipt of applications is **15 September, 1987**. In respect of candidates from Andaman & Nicobar Islands, Lakshdweep and abroad, last date of receipt of applications is **30 September, 1987**.

4. **Method of Selection** A written test may be conducted for certain posts at selected places. No TA/DA would be admissible for this purpose. Candidates called for interview would be reimbursed actual train bus fare by shortest route limited to second class rail fare from the normal place of residence to the place of interview.

5. **Only Indian Nationals need apply**

6. Candidates should send two self-addressed unstamped envelopes 23 x 10 cms. along with the applications.

7. Attested Xerox copies of certificates testimonials should be attached to the application form. No ORIGINALS SHOULD BE FORWARDED.

8. Candidates will have to produce original certificates at the time of interview.

9. Incomplete applications or those received late will be rejected and no correspondence would be entertained in this regard.

10. In case SC/ST candidates are not available in requisite number, general candidates will be considered for posts reserved for SC/ST.

11. Candidates working in Govt./Public Sector Undertakings/Autonomous Organisation should apply through proper channel.

12. Prescribed essential qualifications are the barest minimum and mere possession of the same does not entitle any candidate to be called for interview.

13. Candidates desirous of applying for more than one post may apply separately for each post indicating Item No.

14. Candidates on appointment will have the opportunity to carry out Ph. D. with external registration and may be sponsored for doing M. Tech.

15. Opportunities are also available for study leave for carrying out higher studies abroad.

16. DRDS Officers may be sponsored for training abroad.

17. Though initial place of posting is indicated, yet candidates have the liability to serve anywhere in India.

18. Handwritten applications will not be entertained.

19. No. of posts mentioned against each time are tentative and may vary.

20. Knowledge of French, German, Russian, Japanese, Chinese is a desirable qualification for all the above posts.

21. CANVASSING IN ANY FORM WILL MEAN DISQUALIFICATION.

## APPLICATION FORMAT

Application for the post of

\* (To be indicated)

1. Advertisement No. ;
2. Item No.
3. Details of Postal Order(s)  
No., Date and Amount
4. Name in full (Shri Smt. Km.)  
(in block letters) :
5. (a) Date of Birth :

Affix passport  
size latest  
photograph

- (In Christian Era in Figure)  
(b) Age as on 15 Sept. 1987

6. Nationality :

7. Marital Status .

8. (a) Address for correspondence :  
(b) Permanent Address :  
(in block letters with pin code)

10. Nearest Railway Station .

11. Whether belong to SC/ST : (If yes, attach certificate)

12. Educational Qualifications :

Sr. No.	*Course Passed	University Institution/ Board	Year of Passing	Subjects taken	Result with Division/ Class
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\*In chronological order from X standard (SSLC/HS/HSC) onward.

**13. Professional Training :**

Organisation	Period		Details of training
	From	To	

**14. Employment Record :**

Name & address of the employer institution	Period of service from to	Designation of the post held	Scale of pay of each post	Detailed description of work	Reason for leaving
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**15. Present basic Pay :**

Other allowances :

Total emoluments :

Next Increment due on :

Salary expected :

**16. (A) Are you a Govt. Servant**

(b) If yes, whether Central State UT.

**17. Minimum joining time required .**

**18. List of papers published**

**19. Resume of research work experience, if any :**

**20. Field of special interest :**

**21. Are you under any contractual obligation to serve Central/State/Govt/Army/other public sector undertaking or Autonomous body and if so the details.**

**22. Details of relatives employed in DRDO :**

Name of Relative	Relationship	Lab/Estt. in which employed	Post Held
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**23 Have you applied for post in DRDO during the past two years ?**  
If yes, give particulars .

Sr. No.	No and date of Advt.	Name of Post Discipline	Date of Interview	Remarks
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**24 Any other information you may wish to add (Use separate sheet if necessary)**

**25 Declaration:**

I declare that the foregoing information is correct and complete to the best of my knowledge and belief and nothing has been concealed distorted. If at any time, I am found to have concealed distorted any material information, my appointment shall be liable to summary termination without notice compensation. I will, if and when required, take up duty in the discharge of government assignments anywhere in India.

Place .

Date .

Signature of Candidate

dayp 87 265

# **ANNAMALAI UNIVERSITY**

## **FACULTY OF AGRICULTURE**

### **NOTIFICATION No. 8/87**

**APPLICATIONS** are invited for the post of Lecturers in the Faculty of Agriculture on the subjects given below :

1. Lecturer in Agricultural Botany	1
2. Lecturer in Horticulture	1
3. Lecturer in Soil Science and Agricultural Chemistry	1
4. Lecturer in Agricultural Entomology	1
5. Lecturer in Agricultural Microbiology	1
6. Lecturer in Plant Pathology	1
7. Lecturer in Agricultural Extension	1
8. Lecturer in Agricultural Economics	1

**Qualifications**

A person with a Ph.D. degree or Master's degree in the subject concerned with three years experience.

**Scale of Pay**

Rs. 700-40-1100-50-1600 with admissible allowances. The scale of pay will be revised on the basis of the recommendations of the UGC/State Government shortly.

Those who are in service should route their applications through proper channel.

Application forms can be had from the undersigned on payment of Rs. 10/- by cash/ money order/postal order (not refundable). Filled in applications (5 additional copies) should reach the undersigned on or before 12.9.1987.

**R. Rajamanickam**  
**REGISTRAR**

## CLASSIFIED ADVERTISEMENTS

### INDIAN COUNCIL OF MEDICAL RESEARCH

The Indian Council of Medical Research proposes to appoint a Director at its National Institute of Virology, Pune.

This Institute is engaged in scientific research in different aspects of viral infections such as epidemiology, virology, immunology, biochemistry and entomology with the object of strengthening control measures against viral diseases. There are excellent facilities for undertaking research in these areas of modern biomedicine. The Institute is equipped with modern analytical instruments, an electron-microscope, animal house, library, statistical facilities and other infrastructure for conducting clinical and laboratory studies. It has a field area in Karnataka for conducting epidemiological studies in KFD.

**Job Requirements:** It is a top research management post concerned with research and development efforts in viruses and viral diseases of public health importance, including Japanese encephalitis, Kyasanur Forest Disease, Hepatitis, AIDS, etc. He/she would be required to formulate and successfully implement research programmes of the Institute and coordinate with other agencies for health and research activities. The Director would interact with State Health authorities to help tackle epidemics of viral diseases. He/she would also be responsible for human resources development. He/she will have the overall responsibility for the work of the Institute within the framework of the ICMR system and for ensuring an atmosphere conducive for creative work.

**Qualifications & Experience : Essential :** (i)-(a) MBBS or M.Sc. of a recognised University, and (b) M.D./Ph.D./D.Sc., in Medicine/Pathology/Microbiology/Public Health or related disciplines or equivalent postgraduate qualifications. (ii) Research experience of 15 years with original work to the credit of candidate. (iii) Administrative experience in responsible capacity. **Desirable :** (i) Research experience in arthropod-borne viruses. (ii) Experience in field investigations.

**Salary/Conditions of Service:** The scale of pay attached to the post is Rs. 2000-125/2-2500 (pre-revised) plus allowances as per Central Govt. Rules, including a Non-practising allowance of Rs. 500/- p.m. to medical graduates only. Private practice is not allowed. Benefit of pension admissible. Higher initial pay can also be considered. Free medical aid and leave travel concession are also permissible for the employee and his/her family as per Government Rules.

**Age:** Below 50 years. SC/ST candidates allowed relaxation in accordance with Government of India Rules.

Candidates called for interview will be paid first class rail fare on production of documents.

Applications from employees working in Government Departments, Public Sector Organisations and Government funded research bodies must be forwarded through proper channel.

Applications can be obtained from the office of the Director General, Indian Council of Medical Research, Post Box No. 4508, Ansari Nagar, New Delhi-110 029 to whom the complete application form should be sent on or before 30th September, 1987 accompanied with crossed Indian postal order for Rs. 8 - made out in the name of the Director General, Indian Council of Medical Research, New Delhi. SC/ST candidates are exempted from this payment. Incomplete and late applications will not be entertained.

### MALAVIYA REGIONAL ENGINEERING COLLEGE

JAIPUR

Advertisement No. 3 Estt/87

Applications are invited on prescribed application form by 22.9.1987 for the following posts of Lecturers in the UGC pay scales of Rs. 700-1600 (P=Permanent; T=Temporary). Structural Engg. (1P); Mechanical Engg. (1P, 4T); Electrical Engg./Electronics (1P, 3T). The No. of posts are indicative only and subject to change.

Full particulars and application form may be obtained by sending Rs. 2.50 (cost of application form and postage) in the form of crossed IPO (M.O. will not be accepted) in favour of the undersigned payable at the Post Office at this College along with a self addressed unstamped envelope of the size 24 cm. x 10 cm. The application form can also be obtained from the Accounts Section of the College on cash payment of Re. 1/- only.

REGISTRAR

### INDIAN INSTITUTE OF SCIENCE BANGALORE-560 012

#### NEEDS

#### 1. Deputy Librarian (1A/308 35, 87)

**Essential :** (i) I or II Class M.Lib Sc OR M.A. M.Sc., M.Com with I or II Class B.Lib Sc. or Diploma in Library Science; (ii) At least 7 years experience as Librarian or in a responsible professional capacity in a University Library. (iii) Ph.D. degree or equivalent research work in a field relevant to the profession.

**Desirable :** Experience in computerisation of Library Systems and computerised information processing.

#### 2. Scientific Officer in the Centre for Science Information (Reserved for SCHEDULED CASTE) (1A, 308 36, 87)

**Essential .** M.E./M.Tech. in Computer Science OR M.Sc. (Engg) with experience in programming in FORTRAN, COBOL, DBMS OR M. Lib. Sc. or Associateship of DRTC or Equivalent followed by three years experience in programming in FORTRAN, COBOL, PASCAL and DBMS.

**Desirable :** Experience in Computer based information retrieval systems.

**Emoluments :** Post 1 : Rs. 3075/- p.m. in the scale Rs. 1200-1900; Post 2 : Rs. 2124/- p.m. (approx.) in the scale Rs. 700-1300. Grades to have revision when IV Pay Commission recommendations are adopted.

Details and prescribed application forms can be obtained on request (separate for each post) accompanied by a self-addressed Rs. 5-40 stamped envelope of 28 x 18 cms size and crossed IPO for Rs. 5/- drawn in favour of the Registrar, Indian Institute of Science, for Post 1 (free for SC/ST candidates on production of Caste/Tribe Certificate from a competent authority) before 18-9-1987. Requests without attested copy of Caste Certificate for Post 2 will not be entertained.

REGISTRAR

## JADAVPUR UNIVERSITY

CALCUTTA-700 032

### Employment Notification No A2/C/9/87

The University invites applications in the prescribed form for the following posts :

1. Professor of Physical Chemistry  
—One post

Scale of Pay : Rs 1500-60-1800-100-2000-125/2-2500/-.

#### Qualifications : Essential

An eminent scholar with published work of high quality actively engaged in research. Ten years' experience of teaching and/or research. Experience of guiding research at doctoral level.

OR

An outstanding scholar with established reputation who has made significant contribution to knowledge

Specialisation : MSc. Chemistry with Physical Chemistry as specialisation

Desirable : In any branch of Physical Chemistry.

2. Director of Youth Welfare  
—One post

Scale of Pay : Rs. 1200-50-1300-60-1900 -

#### Qualifications : Essential

(i) Uniformly good academic record with B+Master's degree or its equivalent.

(ii) At least 7 years' experience in a position involving supervision, administration of College or in an institute of higher learning or a Govt./semi-Govt. organisation research institution or other academic bodies

OR

At least 7 years' experience as a teacher in a college or in a University.

(iii) Age not less than 35 years, relaxable in case of exceptionally qualified candidates

Desirable : (i) A doctorate degree of published papers of high standard.

(ii) Degree or Diploma in Social Welfare.

(iii) Experience in handling student activities or promotion of student welfare activities

(iv) Proficiency in Extra-curricular activities of high standard.

Last date of receiving application is September 11, 1987.

Application forms are obtainable from the University Office during working hours on payment of Rs. 2/- or on payment of Rs. 3/- inclusive of postal

charges. No travelling allowance is admissible to candidates called for interview. Higher initial salary may be given to really deserving candidate. Those who are in employment should submit their applications through proper channel. Choice of the Selection Committee will not necessarily be confined to applicants only. Canvassing in any form will disqualify a candidate. Applications received after the prescribed LAST DATE will not be considered.

REGISTRAR

## PUNJABI UNIVERSITY PATIALA

### Advt No 42/Rect/PRO 87

Applications are invited for the following posts so as to reach the Registrar, Punjabi University, Patiala on 22-9-87

1. Professors : Two in the Department of Law and One each in the Departments of Bio-technology, Chemistry (for Forensic Science), Psychology, Social Work, Commerce, Music and Geography.

Grade Rs 1500-60-1800-100-2000-125 2-2500 (UGC)

2. Readers One each in the Departments of Bio-technology, Chemistry (for Forensic Science), Psychology, Social Work and Computer Science & Applications.

Grade : Rs. 1200-50-1300-60-1900 (UGC).

3. Lecturers: Two each in the Departments of Bio-technology, Chemistry (for Forensic Science), Psychology, and One each in the Departments of Social-Work, Urdu, Persian & Arabic (for Urdu),

Library & Information Science, Punjab Historical Studies.

Grade : Rs. 700-40-1100-50-1600 (UGC).

4. Lecturers : (University Model School) Three—One each in Economics, Geography and Physics/Chemistry.

Grade : Rs. 700-25-850/30-1000/40-1200-50-1300 (Govt. Grade).

5 Deputy Librarians : Two

Grade . Rs. 1200-50-1300-60-1900 (UGC).

6 Assistant Librarians : Four

Grade Rs. 700-40-1100-50-1600 (UGC).

Note :

1. Except for the post of Professors of Law, Geography & Lecturers in the Punjab Historical Studies and the University Model School, candidates who have already applied in response to our advertisement of May, 1987, NEED NOT APPLY AGAIN.

2. The Vice-Chancellor could place before the Selection Committee names of suitable persons for consideration alongwith the applications received in response to the advertisement

3. It is not obligatory to call for interview every candidate who possess the essential qualifications

4. The number of vacancies may change

5. Candidate must possess working knowledge of Punjabi

6. The Selection Committee might relax the qualifications and experience in exceptional cases

## ASSOCIATION OF INDIAN UNIVERSITIES

AIU HOUSE, 16 KOTLA MARG, NEW DELHI-110002

Applications from Indian citizens are invited for the following post in the prescribed form available on payment of Rs. 2/- from the Office of the Association :

Deputy Secretary : Pay Scale Rs 3700-5000 (Revised)

Postgraduate with first class or high second class degree with at least ten years experience in an administrative or academic post in University, Government Department/Autonomous Organisation. Knowledge of administrative rules and understanding of issues in university system desirable. Persons with experience of working in Universities/Colleges will be preferred and can be considered for deputation terms.

The post carries dearness and other allowances generally at the Central Government rates. Total emoluments at the initial basic pay of Rs 3700/- amount to Rs. 5435/- including HRA and Special Allowance. Relaxation in any of the requirements may be made in exceptional cases. The Association reserves the right not to fill up the vacancy advertised, if the circumstances so warrant. SC/ST/Ex-servicemen will be given preference. Canvassing in any form by or on behalf of a candidate will be a disqualification.

Applications complete in all respects should reach the Office by September 30, 1987. Persons already in service should apply through proper channel. Applications received after the last date or without complete information may not be entertained.

1987

7. The details of qualifications, specializations etc. will be supplied alongwith the application form.

Application forms can be obtained from the Head, of our Publication Bureau, on payment of Rs. 5/- at the counter OR by sending IPO for Rs. 5/- in favour of the Registrar, alongwith self-addressed envelope of the size 25 x 10 cms with postage worth Rs. 3.40, superscribing on it 'Application Form for the Post of \_\_\_\_\_'.

REGISTRAR

## CENTRAL LEATHER RESEARCH INSTITUTE

(Council of Scientific & Industrial Research)

Advertisement No. 3 87

The Central Leather Research Institute, a national laboratory of CSIR, is the largest research institution in the world devoted to leather science and technology. Current activities related to optimization of processes for improved leather manufacture, new chemical auxiliaries for leather processing and finishing, chemical process development and design, environmental technology, better utilisation of tannery and slaughter-house wastes and footwear science and engineering and leather goods research, supported by relevant R & D inputs from organic, inorganic, physics, bio-inorganic and biochemistry, microbiology, polymer sciences, biophysics, chemical engineering and leather technology groups.

The laboratories of CLRI are well equipped with sophisticated instruments, bench scale and pilot plants and computer centre with latest CAD system and mini computers for leather products design and other research applications.

CLRI proposes to recruit highly talented researchers with proven professional attainments in some of the above areas for the following positions. The R & D activities in the Institute being largely multidisciplinary, the prospective scientists are expected to have the necessary ability and flexibility to work in teams besides being innovative and highly professional.

### Category I—Scientific

#### 1 Scientist E I/E.II - 4 Posts

Rs. 3700-125-4700-150-5000 (Group IV(3) OR

Rs. 45,0-150-5700 (Group IV(4)

#### Post—1 (Chemical Physics Area)

**Qualifications & Experience:** I Class M.Sc. in Chemistry/Physics with 12 years experience or Ph.D. with 10 years experience, with special orientation in Magnetic Resonance Spectroscopy and theoretical chemistry including specialisation in theory, instrumentation and

experimental methods. Original contributions of high calibre as evidenced by publications.

**Desirable:** Experience in planning, setting up and running sophisticated magnetic resonance facilities.

**Job Requirements:** To lead a team of researchers in the area of Chemical Physics/Magnetic Resonance Spectroscopy engaged in Projects of fundamental and applied research. To plan and execute high calibre contemporary research in NMR, EPR and related fields and to plan for creating a multi-purpose high field NMR and modern EPR facilities in the Institute.

#### Post—2 (Polymer Science Area)

**Qualifications & Experience:** Ph.D. in Polymer Chemistry Technology/Organic Chemistry with 10 years R & D experience in synthesis and application of polymers in the coating and adhesive fields with outstanding original work as evidenced by patents/publications and proven ability for planning and carrying out independent work of high quality.

**Desirable:** Theoretical and practical industrial experience in polymers and conversant with pilot plant studies on polymers. Capability to generate new and original approaches in this area.

**Job Requirements:** Expected to organise and conduct research on synthesis and preparation of resins, lacquers and emulsions for leather finishing and tanning aids. Initiate R & D work to synthesise and formulate new polymeric systems needed for leather and leather product applications and development of adhesives for footwear and leather goods application.

#### Post—3 (Technical Services)

**Qualifications & Experience:** I Class B.E. B.Tech in Mechanical Engineering with 12 years experience, preferably with M.E./M. Tech/Ph.D. qualifications in Machine Design Machine Tools Industrial Engineering with a minimum of 10 years experience in the relevant field.

**Desirable:** (i) Experience in the management of centralised workshop facilities in a R & D or Industrial organisation, (ii) Expected to be conversant with operation, maintenance and design of tanning footwear machinery and chemical process plants (iii) Knowledge in the application of computer techniques for engineering jobs (iv) Teaching experience in Machine design, Mechanical Engineering

**Job Requirements.** This is a senior management position in Technical Services. The selected candidate has to provide leadership to a team of mechanical electrical, automobile, electronic and refrigeration engineers and technicians engaged in design, fabrication, maintenance and operation assignments connected with the various functional areas of the Institute. Teaching of footwear machinery to postgra-

duate students may be one of the academic responsibilities.

#### Post—4 (Biotechnology)

**Qualifications & Experience:** Ph.D. in an area of biochemistry, biophysics, biotechnology, molecular biology or any other related branch of modern biology with atleast 12 years research experience after M.Sc. The candidate should produce evidence of independent work of a high quality such as outstanding publications, academic honours and patents and should be capable of generating new and original research ideas.

**Job Requirements:** The selected scientist is expected to perform research as well as to lead a research group on biotechnology or biochemistry relevant to leather science and collaborate with researchers of other disciplines in CLRI and outside and promote growth of interdisciplinary programmes.

#### 2. Scientist 'C', 'E I'—2 Posts

Rs. 3000-100-3500-125-4500 (Group IV (2) OR

Rs. 3700-125-4700-150-5000 (Group IV (3)

#### Post—1 (Biophysics Area)

**Qualifications & Experience:** I Class M. Sc. in Physics with 6 years experience Ph.D. in Biophysics/Physics with 2 years experience (for Scientist C), I Class M.Sc. in Physics Biophysics with 12 years experience or Ph.D. in Biophysics with 10 years experience (For Scientist E. I) pertaining to Biophysical aspects of proteins and related molecules as evidenced by publications in International journals and demonstrated ability to lead a team of researchers in Biophysics group.

**Desirable:** Experience in imaging of matrices of biological substances and knowledge in the area of material testing, electron microscopy, ultrasonics and magnetic resonance

**Job Requirements:** To plan and conduct R & D projects in the development of testing techniques for collagen and leather. To lead a team of scientists working on viscoelasticity and biomechanical aspects of collagen and leather.

#### Posts—2 (Plant Design)

**Qualifications & Experience:** M. Tech/Ph.D. in Chemical Engineering with Chemical Plant Design as specialisation. Experience in relevant field of atleast 4 years for M. Tech., and one or two years for Ph.D. for Scientist 'C' and 10 years for M.Tech., and Ph.D. in case of Scientist E. I.

**Desirable:** Familiarity with computer aided flowsheeting, graphics, ASME and other codes, project engineering of tanneries and chemical process plants.

**Job Requirements :** To provide project leadership in basic design engineering assignments and to supervise the work of junior scientists in chemical process equipment design.

### 3. Scientist 'C'—3 Posts

Rs. 3000-100-3500-125-4500 (Group IV (2))

#### Post—1 & 2 (Chemical Engineering Area)

**Qualifications & Experience** M.Tech./M.E./Ph.D in Chemical Engineering with specialisation in Process Control/Polymer Reaction Engineering/Thermodynamics. 4 years experience with M.Tech./M.E. or 2 years experience with Ph.D qualification in a Chemical Engineering research laboratory

**Desirable :** Capability (a) to set up independently a research laboratory in the desired area of specialisation (b) To design and supervise experimental investigations, analyse plant data and prescribe suitable measures for commercial chemical plants and tanneries and (c) to interact effectively with scientists of other disciplines

**Job Requirements :** To provide leadership to multi-disciplinary research teams and to supervise day-to-day research work in the area of specialisation, including chemical process development

#### Post—3 (Instrumentation)

**Qualifications & Experience :** 1 Class M.Sc. in Physics/Electronics/Chemistry with 6 years of experience or M.Tech (Electronics) with 4 years experience in handling, maintenance and operation of sophisticated analytical instruments. Proven record of high proficiency in maintaining analytical instruments like HPLC, FT instruments, NMR, UV Visible and other spectrometer

**Desirable :** Experience in running a centralised instrumentation service centre and maintenance of electronic instruments.

**Job Requirements :** To maintain and operate a range of analytical instruments and be responsible for the functioning of the central instrumentation facility and rendering service to R & D personnel.

### 4. Scientist 'B'/'C'—2 Posts (Leather Process Technology)

Rs. 2200-75-2800-EB-100-4000 (Group IV (1) OR

Rs. 3000-100-3500-125-4500 Group IV (2))

**Qualifications & Experience :** 1 Class M.Tech in leather technology. Preferably with practical experience in a commercial tannery for 2-3 years. Should be well acquainted with modern leather processing technology. A minimum of 4 years experience is required for Scientist 'C' position,

**Job Requirements :** To plan and execute research projects in process control and optimisation of tanning processes/low waste technologies with accent on energy, water and chemical savings.

### 5. Scientist 'B'—10 Posts

Rs. 2200-75-2800-EB-100-4000 (Group IV (1))

#### Post—1 (Biotechnology Area)

**Qualifications & Experience** 1 Class M.Sc. in Microbiology/Biochemistry/Botany.

**Desirable :** 5 years experience in the above area or Ph.D in any of the above disciplines, supported by research publications. Knowledge in Biotechnology.

**Job Requirements :** Expected to work in the bioabsorption of heavy metals and biodegradation of toxic organic substances

#### Post 2— (Chemical Physics Area)

**Qualification & Experience** 1 Class M.Sc. in Spectroscopy/Physical Chemistry/Theoretical Chemistry preferably with Ph.D qualification in the same subject.

**Desirable :** Experience in practical magnetic resonance, quantum chemical computation and spin dynamics calculations—NMR Instrumentation.

**Job Requirements :** Expected to work in R & D projects involving application of FT-NMR and EPR and Data interpretation employing quantum chemical methods to manage the NMR facilities.

#### Post—3 (Polymer Science Area)

**Qualifications & Experience** 1 Class M.Sc. in Polymer/Organic Chemistry preferably with Ph.D. qualification in the area of polymers.

**Desirable :** Research experience on modification of natural polymers like casein, gelatin, cellulose for leather applications.

**Job Requirements :** To work in the field of polymer synthesis, their modifications and characterisation.

#### Post—4 (Engineering Sciences Division)

**Qualifications & Experience :** 1 Class M.Sc. degree in Environmental Sciences/Environmental Technology.

**Desirable :** Experience of about 2 to 3 years in the fields of water and industrial waste water sampling, analysis and treatability studies.

**Job Requirements :** To assist senior scientists in carrying out field studies, characterisation of effluent samples and in preparation of project reports for effluent treatment units of tanneries and chemical process plants.

### Post—5 (Plant Design)

**Qualifications & Experience :** 1 Class B.E./B. Tech. in Chemical/Mechanical Engineering or M.Tech./M.E. in Chemical Plant Design/Equipment Design.

**Desirable :** Post-graduate degree in Chemical Plant Design or 2 years experience in basic engineering of chemical process plants or tanneries. Familiarity with computer programming in FORTRAN-IV/BASIC/C languages.

**Job Requirements :** To participate in process and equipment design activities related to basic engineering assignments

### Post—6 & 7 (Chemical Engineering Area)

**Qualifications & Experience :** 1 Class B.Tech/B.F. in Chemical Engineering or M.Tech/M.E. in Chemical Reaction Engineering/Process Control/Heat and Mass Transfer/Thermodynamics

**Desirable :** Knowledge of computer programming, modelling and simulation of chemical process plants

**Job Requirements :** To participate in process development properties evaluation activities of research projects

### Post—8 (Computer Centre)

**Qualification & Experience :** 1 Class B.F./B.Tech in Chemical Engineering/Mechanical Engineering with Computer Science as an elective subject or M.Sc. in Computer Science/Statistics with 1 or 2 years experience in software development related to chemical process equipments, statistical analysis, chemical hazard analysis, unit element analysis.

**Job Requirements :** To assist the senior scientists in developing computer software in the selected area and in programming in high level Fourth Generation Computer Languages

### Post—9 (Leather Product Technology)

**Qualifications & Experience** M.Tech in Leather Technology with knowledge of manufacture and Computer Aided Design for footwear or B.Tech (1 Class) in Leather Technology/Mechanical Engineering with advanced knowledge/training in footwear science and engineering or B.Tech. followed by M.S. in Bio-medical Engineering.

**Job Requirements :** To assist the senior scientists of Footwear area on problems connected with footwear R & D viz. gait analysis, shoe last designing, footwear designs and fabrications and quality control

### Post—10 (Microbiology)

**Qualifications & Experience :** First Class M.Sc. Preferably a Ph.D. candidate with a good record of original work evidenced by publications in reputed journals, preferably related to leather processing and preservation preferred. R&D experience in biotechnology desirable.

**Job Requirements :** To assist senior scientists in the planning and execution of R & D projects on biodegradation and biological treatment of tannery effluents for their disposal/utilisation, and leather preservation

#### Category II—Technical

#### \*1. Senior Technical Assistant—1 Post (Polymer Science Area)

Rs. 1640-60-2600-EB-75-2900  
(Group III(2))

**Qualifications & Experience :** Degree in Chemistry preferably with 3-5 years experience in the field of polymers.

**Desirable** Experience in the development of surface coatings and adhesives as applied to leather and leather products.

**Job Requirements :** To assist senior scientists working in the development of adhesives and other polymeric products for leather processing.

#### 2. Senior Documentation Assistant—1 Post (Information Sciences)

Rs. 1640-60-2600-EB-75-2900  
(Group III(2))

**Qualifications & Experience** A good degree in Science with Chemistry as one of the subjects with M.L.I.S. or equivalent with 3-5 years experience or M.Sc. with Chemistry at B.Sc. level and B.L.I.S. with 5 years experience.

**Desirable :** Master's Degree in Science and Library Information Science and Documentation with proven knowledge and experience in computer applications in library and information field.

**Job Requirements** To assist in library and documentation activities including application of computers to information, handling and compilation of bibliographies directories, etc.

#### 3. Technical Assistant Grade VIII—8 Posts

Rs. 1400-40-1800-EB-50-2300  
(Group III(1))

##### Post—1 (Collagen Area)

**Qualifications & Experience :** Degree in Chemistry/Biology.

**Desirable :** 3 years of experience in a microbiological/biochemical lab. of a research institution.

**Job Requirements :** To assist the scientists in Microbiological, Biochemical experimental work.

##### Post—2 (Chemical Physics Area)

**Qualifications & Experience:** Degree in Physics/Chemistry with good academic record and aptitude for Instrumentation or 3 year Diploma in Electronics, with 2

years experience in Radio frequency/microwave electronics, digital electronics, experience with personal, mini computers

**Desirable :** 1 Class degree with proven aptitude for Instrumentation. Experience in NMR/EPR Laboratory.

**Job Requirements** . To maintain, operate and run routine spectra on 90 MHz FT-NMR facilities.

##### Post—3 (Plant Design)

**Qualifications & Experience** 3 years Diploma in Mechanical Engineering/Chemical Engineering with machine design as elective, specialisation. Preferably 1 or 2 years drafting experience in a reputed design engineering office.

**Desirable :** Familiarity with chemical process flowsheets and engineering flow diagrams.

**Job Requirements** To assist the senior scientists in plant design and drawing.

##### Post—4 & 5 (Leather Process Technology)

##### Qualifications & Experience

**Post—4 :** A degree in leather technology or a diploma in Leather Technology.

**Desirable :** 2-3 years experience in leather manufacture.

**Job Requirements** To carry out experiments in processing of upper leathers, garment and glove leathers, sports goods leathers etc

**Post—5** B.Sc. in Chemistry with knowledge of various chemical principles involved in leather processing or B.Tech. in Leather Technology with a thorough knowledge in the physical testing and chemical analysis of various types of leathers

**Desirable .** 3-5 years experience in a testing laboratory in the case of B.Sc. degree holders.

**Job Requirements .** To assist senior scientists in quality control and process standardisation of different types of leathers

##### Post—6 (Chemical Engineering Area)

**Qualifications & Experience** A Diploma in Chemical Mechanical Engineering Leather Technology or B.Sc. with Mathematics, Physics and Chemistry.

**Desirable :** First Class in their respective degrees/diplomas, with 1 or 2 years experience in a research laboratory or pilot plant is preferred.

**Job Requirements :** To assist the

senior scientists in operation and maintenance of chemical process equipments and instruments in bench and pilot scale plants.

##### Post—7 (Instrumentation)

**Qualifications & Experience :** Degree in Chemistry/Physics and good working knowledge in spectroscopic and chromatographic techniques.

**Desirable :** 1 Class with 1-2 years experience in a well equipped R & D laboratory with capability to operate GC, HPLC and spectroscopic instruments.

**Job Requirements** To assist the scientists in running the central instrumentation facility and in the maintenance of the various instruments.

##### Post—8 (For Regional Centre for Extension & Development (CLRI), Jalandhar.

**Qualifications & Experience :** Degree in Chemistry or Diploma of 3 years duration in Leather Technology.

**Desirable .** 8 years experience in a commercial tannery. Experience in processing of sports goods leathers and other varieties of finished leather from buff calf. Knowledge of Punjabi Hindi preferable.

**Job requirements :** To assist the Scientist-in-charge in technical activities of the centre and in extension services in the northern region.

##### General Conditions

1. The post of Scientist E.I.E. II, Scientist C.E.I, Scientist 'C', Scientist B.C and Scientist B are contractual for a period of six years (including the period of probation of two years) in the first instance and the other posts are temporary. All posts carry usual allowances as admissible under Central Govt. Rules. Higher initial start may be considered for deserving candidates. Total emoluments at the minimum of the grades at present are as follows :-

On Rs. 4500/-	—Rs. 5880/-
On Rs. 3700/-	—Rs. 4880/-
On Rs. 3000/-	—Rs. 3940/-
On Rs. 2200 -	—Rs. 2926/-
On Rs. 1640 -	—Rs. 2296/-
On Rs. 1400 -	—Rs. 1807/-

2. Candidates with engineering qualifications if so required, are liable to serve in any defence service or post connected with defence of India for a period of not less than 4 years including period spent on training, if any, provided that such a person (a) shall not be required to serve on the above post after expiry of ten years, from the date of appointment and (b) shall not be ordinarily required to serve as aforesaid attaining the age of 45 years.

3. **Reservations :** For the posts under Sl. No. 4 & 5 Scientist B/C & Sct. B 3

posts are reserved for Scheduled Caste and 3 posts are reserved for Scheduled Tribe. For the posts of Senior Technical Assistant/Senior Documentation Assistant—One post is reserved for Scheduled Tribe. Out of the 8 posts of Technical Assistant Grade VIII two posts are reserved for Scheduled Caste.

4. A lower standard consistent with efficiency will apply in the case of SC/ST candidates. Candidates belonging to these communities should invariably enclose an attested copy of the caste certificate issued by a competent authority along with their applications, failing which they will not be entitled to the concession.

5. The number of vacancies mentioned against each category is provisional and may vary at the time of selection. If more approved vacancies with identical job requirements become available at the time of selection, these also can be filled from the candidates who apply in response to this advertisement.

6. Candidates working in Govt. Semi Govt. Offices Public Sector undertakings should send their applications through their employers so as to reach the Institute within 15 days from the due date of receipt of applications. Advance copy of the applications will be considered only if the original applications are received through proper channel.

7. The Institute has a system of periodic assessment promotion on merit. For this purpose, Scientific and Technical posts are categorised into 4 groups on the basis of nature of work. Group IV is the top most group meant for scientific staff and commences with Group IV(1)—Rs. 2200-4000 with scope for promotion from grade to grade upto Group IV(5)—Rs. 5100-150-5700-200-6300 subject to prescribed conditions. Group III is the next lower group meant for Technical staff and its lowest grade is Group III(1) (Rs. 1400-2300) with possibility for promotion from grade to grade upto Group III(5)—Rs. 3000-100-3500-125-4500 subject to prescribed conditions. Members of Group III possessing M.Sc./B.E. or equivalent qualifications cannot move to Group IV. Their promotion is confined to Group III only.

8. Applications should be submitted for all the 2 categories in the prescribed form obtainable upto 15.9.1987 on request from the Administrative Officer, Central Leather Research Institute, Adyar, Madras 600 020, by sending a self addressed stamped (Re 1.40) envelope (25 cms x 15 cms) indicating the No. of Advertisement, Category of post and the post applied for. Applications completed in all respects, accompanied by a Crossed Indian Postal Order payable to Director, CLRI, at Adyar P.O. for Rs 8 - towards application fee (No application fee for SC/ST candidates) should reach on or before

25.9.1987. Separate applications should be sent for each post applied for, along with the requisite Postal Order. Candidates should send the IPO only with the completed applications.

9. Travelling allowances as admissible under the rules will be paid for the interviewed candidates. SC/ST candidates not employed in Govt./Semi Govt. Organisations / Govt. Undertakings / Corporations etc. will be paid travelling expenses as per rules. While enquiries concerning research activities are welcome, interim enquiries regarding recruitment progress or incomplete applications or request for forms without self-addressed and stamped envelope, will not be considered.

10. Since it is not possible to call all the applicants for interview Test, the applications will be shortlisted for the purpose and the decision of a duly constituted Screening Committee of the Institute will be final in this matter.

"Canvassing in any form and or bringing in any Influence, Political or otherwise, will be treated as a disqualification for the posts"

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Under Secretary (Publications)

**ASSOCIATION OF INDIAN UNIVERSITIES**

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# ATMA RAM SANATAN DHARMA COLLEGE (UNIVERSITY OF DELHI)

**DHAULA KUAN, NEW DELHI-110021**

**Telephone : 673436**

Applications in the prescribed proforma, obtainable from the College Office on request or by sending self-addressed stamped envelope (23 cm x 10 cm), are invited for the following posts of lecturers, in the grade of Rs. 700-1600 and usual allowances, as per the University of Delhi rules:

I. 1. History	— (Permanent Vacancy) — 1
2. Mathematics	— (Permanent Vacancy) — 1
3. Political Science	—(i) (Permanent Vacancy) — 1 (ii) (Part-Time) Temporary Vacancy — 1
II. Director of Physical Education	— (Permanent Vacancy) — 1

## Qualifications

For lecturers' posts listed at 1 to 3 :

(a) A Doctorate degree or research work of equally high standard; and

(b) Good academic record with at least Second Class (C in the seven point scale) Master's degree in a relevant subject from an Indian University or an equivalent degree from a foreign University.

Having regard to the need for developing inter-disciplinary programmes, the degree in (a) and (b) above may be in relevant subjects

Provided that if the Selection Committee is of the view that the research work of a candidate as evident either from his or her thesis or from his or her published work is of a very high standard it may relax any of the qualifications prescribed in (b) above.

Provided further that if a candidate possessing a Doctor's degree or equivalent research work is not available or is not considered suitable, a person possessing a good academic record, (weightage being given to M.Phil or equivalent degree or research work of quality) may be appointed on the condition that he will have to obtain a Doctor's M.Phil degree or give evidence of research of high standard within ten years of his appointment, failing which he will not be able to earn future increments until he fulfils these requirements.

For determining "good academic record" the following criteria shall be adopted :

(i) A candidate holding a Ph.D./M.Phil degree should possess at least a second class Master's degree ; or

(ii) A candidate without Ph.D./M.Phil degree should possess a High Second Class Master's degree and second class in the Bachelor's degree ; or

(iii) A candidate not possessing Ph.D/M.Phil degree but possessing second class Master's degree should have obtained first class in the Bachelor's degree.

## Desirable Qualification for the Post of Lecturer in History

Specialization in European/Modern Indian History. Knowledge of Russian History and ability to teach through the Hindi Medium will be an additional qualification

## Qualification for the Post of Director of Physical Education

(i) A Master's Degree in Physical Education (High Second Class) with Diploma in Sports Coaching from a recognised Institute

OR

A Master's Degree in Physical Education (High Second Class) with a record of having represented his University at the Inter-University level/State level in the National Championship.

(ii) Minimum experience of ten years in organising games and sports (as exemplified in handling of about half a dozen teams in a year in his Institution and their participation in the University/Inter College Tournaments) and ability to encourage mass participation in games and sports.

Note : The College reserves the right to revise the actual number and the nature of vacancies to be filled up subject to the actual need and within the teacher-pupil ratio constraints

Completed applications for the posts listed above, alongwith attested copies of degrees/testimonials, should reach the Principal on or before 18.9.87.

**Dr. R.K. Kaushik**  
**PRINCIPAL**

## PANJAB UNIVERSITY

**CHANDIGARH**

(Advt No 6'87)

Applications are invited for the following posts of Professors in the Pay-scale of Rs.1500-60-1800-100-2000-125/2-2500 so as to reach the registrar, Panjab University, Chandigarh, alongwith Postal Orders of Rs 10/- by 17.9.1987. Fourteen days extra time is permissible to persons who have to submit their applications from abroad .

1. Bhai Vir Singh Studies in Modern Literature-1

2. Panjabi Lexicography (Unit)-1

3. Panjabi-1
4. Sociology-1

## A. Qualifications : Essential :

An eminent scholar with published work of high quality actively engaged in research. About ten years' experience of teaching and/or research. Experience of guiding research at doctoral level.

OR

An outstanding scholar with established reputation who has made significant contribution to knowledge

## B. Desirable

1. Professor in Bhai Vir Singh Studies in Modern Literature :

Scholars with specializations of Comparative Modern Indian Literature with experience in teaching and guiding research in the field of comparative study of modern Panjabi Literature with any other modern Indian Literature.

## 2. Panjabi Lexicography (Unit)

Scholars in the field of applied linguistics/semantics will be given preference.

Note : 1. The Vice-Chancellor could place before the Selection Committee names of suitable persons for its consideration alongwith the applications received in response to the advertisement.

2. It is not obligatory on the part of the University to call for interview every candidate who possess the essential qualifications.

3. The number of vacancies may change.

4. The University may also prepare a panel of suitable candidates for appointment against vacancies occurring within a specified period.

Candidates who do not possess a doctoral degree are required to submit 10 typed/cyclostyled copies of brief resume of their published work. The candidate has the option to fill this form in all respects on both sides and to attach 9 photostal copies thereof. The candidates are also required to attach ten copies of the list of their research publications with their 'Summary Biodata'.

Persons already in service must route their applications through proper channel. They may, however, send an advance copy of their application, on the prescribed proforma, direct to the University. They will be allowed to present themselves for interview only on the production of a 'No Objection Certificate' from their employers. Incomplete forms will not be considered. Forms received after the due date are liable to be rejected unless the Vice-Chancellor condones the delay by a special order. Attested copies of certificates in support of qualifications for Matriculation/School Leaving, Graduation, Post-graduation examination as also for Doctorate degree, be attached to the application. Canvassing in any form will disqualify the candidate.

Application forms can be obtained from the Cashier, Panjab University, Chandigarh, personally on payment of Rs. 2 - or by making a written request to the Assistant Registrar (Estt. 1), Panjab University, accompanied by a self-addressed stamped (worth Rs. 3.40) envelope of 23 x 10 cms and postal order of Rs. 2/- drawn in favour of the Registrar, Panjab University, Chandigarh

MMG/5296

**DEVI AHILYA VISHWAVIDYALAYA, INDORE**

University House, Indore-452 001

Advertisement No. Estt./III (9)/87

Dated : 20.8.1987

Applications in the prescribed forms are invited for the following posts in the University Teaching Departments/Computer Centre so as to reach the undersigned on or before 5th October, 1987.

S. No.	Department	Post
1.	Bio-Chemistry	(a) Professor-1 (b) Reader-1 (c) Lecturer-1
2.	Physics	(a) Professor-1 (b) Reader-1
3.	Life Sciences	(a) Professor-1 (b) Reader-3
4.	Chemistry	(a) Professor-1 (b) Reader-1 (c) Lecturer-2
5.	Mathematics	(a) Reader-2 (b) Lecturer-1
6.	Statistics	(a) Reader-1 (b) Lecturer-1
7.	Education	(a) Professor-1 (b) Reader-1 (c) Lecturer-2
8.	Economics	Lecturer-2
9.	Business Management	Reader-1
10.	Journalism and Mass Communications	Reader-1
11.	Computer Centre	(a) Head of Computer Centre-1 (b) System Engineer-1 (c) System Analyst-1 (d) Maintenance Engineer (Jr) -2

2. The scales of pay for the above posts and present total emoluments on initial basic salary in each scale are as follows :

Post	Old U G C. Scale of Pay (under revision)	Emoluments on initial Basic Pay
Professor/Head of Computer Centre	Rs. 1500-60-1800-100-2000-125/2-2500/-	Rs 3725 - Approx
Reader/System Engineer	Rs. 1200-50-1300-60-1900 -	Rs. 3370 - -do-
Lecturer/Programmer/Maintenance Engineer (Jr)	Rs. 700-40-1100-50-1600/-	Rs. 2310 - -do-

3 Application forms together with details of qualifications, specialisation etc. can be obtained from the University Office on payment of Rs 5 - in person or by sending a Crossed Indian Postal Order of Rs. 10 - payable to the Registrar, Devi Ahilya Vishwavidyalaya, Indore.

S.P. Arya  
REGISTRAR

**INTERNATIONAL INSTITUTE FOR POPULATION SCIENCES**

(Deemed University)

Govandi Station Road, Deonar, Bombay-400088

Applications are invited for the following posts :

1. Professor in Population Studies (Three)—two with specialisation in the field of inter-relationship between population dynamics and economic development and/or social change (one in economics and other in social change) and another with specialisation in Public Health and Mortality Studies. Scale of Pay : Rs. 4500-150-5700 (Revised).

2. Reader in Population Studies (Two)—one with specialisation in Migration and/or Urban Studies and another in Public Health and Mortality Studies. Scale of Pay : Rs. 3000-100-3500-125-5000 (Revised)

3. Lecturer in Population Studies (Three)—two with specialisation in the field of inter-relationship between population dynamics and economic development and/or social change and another with experience in organizing short-term training Courses. Scale of Pay : Rs. 2200-75-2800-100-4000 (Revised).

The application form along with the details of qualifications, experience etc. required for the posts may be obtained from the Administrative Officer either in person or with a self-addressed envelope of 25 x 12 cm. in size, affixing Re 1.50 stamp, indicating the post for which the application form is requested.

The posts carry dearness and other allowances as admissible to Central Government employees of equivalent grade stationed in Bombay. The last date for request for application form is 14th September 1987. The completed applications should reach the Institute latest by 30th September, 1987.

K. Srinivasan  
DIRECTOR

**SHRI SANT GAJANAN MAHARAJ  
COLLEGE OF ENGINEERING  
SHEGAON**

**WANTED**

Professors, Asstt Professor & Lecturers in Computer Engg Computer Science Qualifications & salary as per UGC rules. Persons with experience will be considered for higher start. Apply on or before 20th Sept, 1987

**PRINCIPAL**